APRIL 17, 1961

American Machinist / Metalworking Manufacturing

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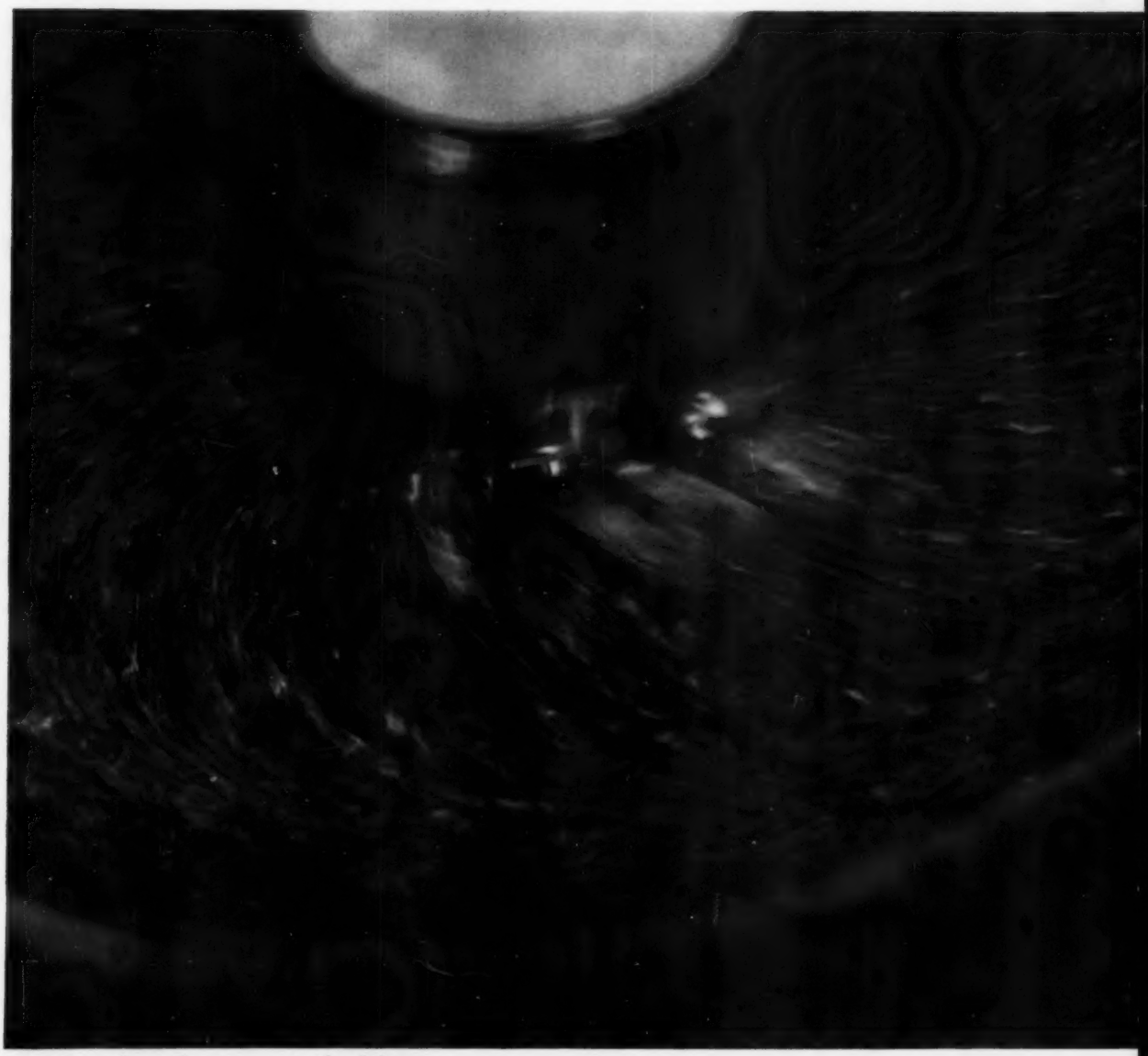

Rotation plus vibration speeds deburring—see page 1

VAPOR DEGREASING

A Special Report, page 127

INTERNAL GRINDING...

Are Two Wheels Better Than One?

by George H. Lockwood
Manager, Research & Development
The Heald Machine Company

Until very recently, internal grinding of a straight or taper bore has always been done with a single grinding wheel. Although this method has worked very well and will continue to be widely used, it is subject to inherent limitations under some circumstances.

In the first place, using the same wheel for both rough and finish grinding requires a compromise in grit selection. A wheel coarse enough for maximum efficiency of stock removal in the roughing portion of the cycle may not give a sufficiently smooth surface for the finish grinding operation. So grinding speed must be weighed against surface finish, and a suitable compromise selected.

Secondly, in single-wheel grinding the wheel is usually dressed between the rough and finish portions of each grinding cycle. This increases the total cycle time by the time necessary for the dressing operation.

Both of these limitations have been removed by a unique double-wheel grinding arrangement which was first demonstrated publicly by Heald at the 1960 Machine Tool Exposition. This setup uses a single wheelhead with two separate wheels mounted on the same spindle—one for rough grinding and the other for finish grinding (see diagram below). Actual wheel specifications can be determined on the basis of maximum performance—a coarser roughing wheel for faster stock removal and a finer finishing wheel for a lower micro-inch finish. Change from rough grinding to finish grinding is simply a matter of automatically changing the position of the machine table, with no interruption of the cycle. Both wheels are dressed while the work is being loaded, hence dressing adds no time to the cycle. This represents a significant reduction in overall cycle time.

With these resultant advantages—more efficient rough and finish grinding plus no time out for dressing—a workpiece that would ordinarily require 25 to 30 seconds on a single-wheel machine, can now be ground in less than 10 seconds by the two-wheel method.

This new method is ideally suited to high production runs where maximum output is essential. But it is not the universal solution to all grinding problems. Wheel costs may run somewhat higher, since both wheels are normally dressed during each cycle and as much is removed from the finishing wheel as from the roughing wheel. An economic study of your particular requirements will show which method—one wheel or two—will yield the maximum return on your machine investment.

Heald Model 190A Centri-Matic internal grinding machine arranged for high speed double-wheel grinding of bearing races.

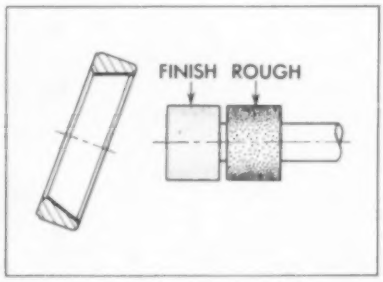

Diagram of double-wheel setup for grinding taper I.D.s of bearing outer races. The roughing wheel is mounted nearest to the wheelhead to reduce spindle deflection under heavy feeding pressure.

Your Heald engineer will be glad to tell you more about this interesting development. **It PAYS to come to Heald.**

THE HEALD MACHINE COMPANY
Subsidiary of The Cincinnati Milling Machine Co.
WORCESTER 6, MASSACHUSETTS

CIRCLE 151 READER SERVICE CARD

COVER:

Waterfall effect produced by combined vertical and orbital motion is clearly visible in vibratory finisher at Southwestern Engineering Co. *See p141.*

American Machinist / *Metalworking Manufacturing*

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TURN PAGE FOR METALWORKING REPORT ——►

METALWORKING REPORT

. . . what's new and significant in manufacturing techniques and materials—direct from our own staff and round-the-world news bureaus

FORMING . . . Problems are being solved in the explosive forming of refractory metals, a process that requires high temperatures and extreme caution. Ryan Aeronautical Co reports **forming titanium at 1200 F using sand as a shock transmitting medium** and a die heated by Cal-rod units. National Northern Div of American Potash and Chemical Corp reports explosive forming at workpiece temperatures of 2400 F.

MATERIALS . . . Molecular bond of stainless to aluminum gives a sheet about half the weight of similar size of stainless, and having the desirable characteristics of each metal. This development by Composite Metals Products, Inc, for Fairmont (W Va) Aluminum Co is reportedly the **first successful molecular bond in sheet form of these two dissimilar metals.** First applications will be in cooking utensil manufacture, but material should have broad industrial applications. Details on p157.

HEAT TREATING . . . New nitriding process, called Tufftriding, reportedly improves abrasion and wear resistance as well as fatigue strength in ferrous metals. Therefore, it **allows substitution of less costly metal in a given part without sacrificing performance.** For example, a Tufftrided SAE 1045 part can be substituted for a 4137 part. In the process—developed by Degussa-Durferrit (West Germany) and handled in US by Kolene Corp, Detroit—a low-temperature salt bath (1050 F) **supersaturates metal surface with nitrogen to a greater depth than a normal nitride case.**

WELDING . . . The plasma torch is now a practical welding tool. High heat output of the device made this development a natural assumption (AM—Oct 19 '59, p125), but it's only now been perfected. The Linde Co Division of Union Carbide Corp, introducing the tools at the AWS Show this week, claims **extremely good depth-to-width ratio with excellent depth control and absolute arc stability.** Variations in torch distance have little effect on weld. See p115.

ASSEMBLY . . . New ultrasonic device that seals oriented plastics is claimed to be the first commercial solution to the problem of sealing these polyesters whose strength comes from the molecular orientation. **Previous methods were unsatisfactory because the heat-sealing methods used destroyed the orientation** of molecules, thus weakening the seam. The Sonoseal, from International Ultrasonics, Inc, of Newark, NJ, **claims to retain 90 to 100% of original strength after joining with ultrasonic vibrations.**

CUTTING . . . Holes six inches deep can be gun-drilled in superalloys such as U-500, U-700, and DCM to diameters as small as 0.093 in. Work was reported by D A Stewart of the General Electric Co at the 1961 SAE National Aeronautic Meeting. Holes 12 in. deep and 0.125-in. dia were also successfully drilled. **Finish was consistently 15 micro-in. and hole tolerances were held to 0.001 in. over usable tip diameter.** Tip is C-2 carbide, with 35° primary and 20° secondary angle. Primary and secondary clearances of 10° and 20° respectively, were used.

CLEANING . . . Jet spray of molten salt removes anneal scale from stainless-steel strip, bypassing scratch or gouge damage normally encountered from rollers that carry the strip through conventional salt baths. Kolene Corp, Detroit, is running a small-scale pilot line (for strip 8-in. wide) that includes spray, rinse, acid dip, water **brushing,** and drying; **it is equipped with rubber rollers that protect the strip.** Treatment of 300 and 400 series stainless is effective with short acid rinse.

CUTTING . . . Automatic external form grinder at least doubles output as it precision grinds crowned spherical coupling teeth (as shown, right). With automatic down-feed plus automatic wheel dressing, **spherical couplings are held within 0.0004 inch** on the modified involute form, tooth-to-tooth spacing within 0.0002 inch, and **maximum spacing error between any two teeth within 0.0006 inch.** The grinder—which was built specially for Bell Helicopter Co (Fort Worth) by the Gear Grinding Div of Michigan Tool Co (Detroit)—uses a rocker arm action to cut a spherical tooth rather than flat shape.

INSPECTION . . . Ultrasonic flaw detector needs no liquid coupling, and therefore can be used on objects which would be damaged by liquid immersion or oil coating. The device is **coupled to test object with a newly-developed synthetic membrane** which fits tightly over the transducer. Graphite and solid propellant fuels can now be tested with non-destructive methods. The Metalloradar from Circu Corp **also makes effective contact to irregular surfaces,** such as bolt ends.

HEAT TREATING . . . New resistance furnace, that operates to 4500 F with pressures in the 0.1 micron range, does sintering, brazing, and heat treating. This internal-element vacuum furnace, described by Mel Schwartz of The Martin Co in a paper to be presented this week at the American Welding Society's annual meeting, **has no non-metallic refractories inside the vacuum chamber** (refractory insulation causes serious problems, as it can't withstand heat over 4000 F) except thermocouple and power feed. Metal shields control heat loss; tantalum heating elements are used.

WELDING . . . Steel shot makes better backup than copper for double-V weld joints. It's versatile and economical, and **it produces root welds that need no back chipping.** An American Welding Society paper reports on tests made at Battelle Memorial Institute on 1-in.-thick manganese-moly armor plate with low-hydrogen electrodes (E10016). The shot was about the same composition as the electrode and coated with a thin film of baked aluminum paint.

Continued on next page

Coming in AM/MM

- *Welding Polaris missile cases*
- *How to maintain progressive dies*
- *The outlook for capital spending*

METALWORKING REPORT . . .

HEAT TREATING . . . Mechanical properties of titanium alloy sheet (13 Ti-11V-3A1) can be improved in several ways. Aging is a common treatment. Now, Armour Research Foundation reports that **cold rolling prior to aging can develop strengths of 220,000 psi** with 2% elongation. Aging was at 700 F. Properties almost as good were attained by a duplex treatment consisting of aging at 800 to 900 F for 60 to 400 hr followed by a flash anneal at 1000 to 1100 F for 5 to 160 minutes.

MATERIALS HANDLING . . . A pressurized "walk-in" passageway, built into the 120-ft-long main girders, houses electronic and mechanical equipment of a Harnischfeger overhead traveling crane. **Maintenance and repair are carried out in the passageway,** thus simplifying work and increasing safety. A pressure of 2 lb above normal keeps dust out of the passageway, and also protects equipment against overheating.

WELDING . . . Finger-tip current control simplifies Mig welding for pipeline and other out-of-position jobs. Operator can adjust current without changing his grip. In a paper prepared for the AWS Annual Meeting, W W Walker tells how Air Reduction Sales Co has applied its Dip Transfer process to pipeline work, says **it can weld 5%Cr-0.5%Mo pipe without heat treatment or special backup inserts.**

MATERIALS HANDLING . . . Interchangeable part orientators make vibratory feeders more versatile because they allow one basic feeder to perform the work of five. On a feeder developed by USI Robodyne, the 120-degree segment that lines up parts for feeding comes in five types. **Shifting from feed of one type of part to a radically different one is simply a matter of changing the segment.**

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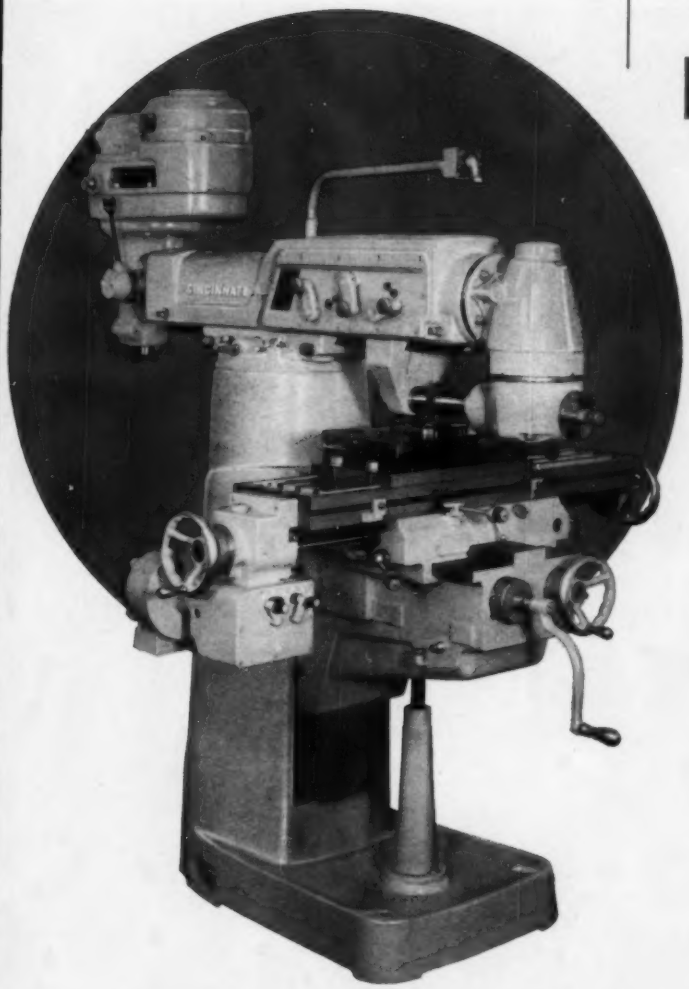
CINCINNATI

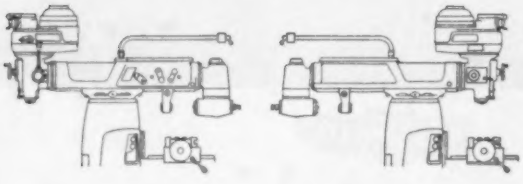
CINCINNATI MILLING MACHINE DIVISION

Announces New

H-V TOOLMASTER
MILLING MACHINE



Horizontal or vertical milling head is available within a minute or two, by merely swiveling the overarm turret of this H-V Toolmaster Milling Machine equipped with a No. 1D Vertical Head. Drawings below illustrate its unique range of versatility.



How's this for a new idea in light-duty toolroom milling . . . a turret type machine for both horizontal and vertical operations! The new CINCINNATI H-V Toolmaster gives you this unique degree of versatility. In the illustration, the H-V is performing a horizontal milling operation with the double swivel spindle head. The arbor and arbor support can be removed, and the same spindle head is ready for vertical or angular milling operations. Or to save setup time, the machine may be equipped with any one of three vertical spindle heads on the opposite end of the overarm. Then the double swivel head becomes a permanent horizontal setup, with 2 hp drive. Merely swiveling the overarm turret 180° locates the vertical spindle over the table for vertical and angular milling, drilling and boring.

H-V Toolmaster versatility is unmatched by any other machine in its class. Vital statistics for the spindle head include: 2 hp gear drive . . . eight spindle speeds, 75 to 1130 rpm or 50 to 750 rpm . . . No. 40 standard spindle nose . . . arbor support for arbors up to 1¼" diameter.

More information on the H-V and on the entire line of Toolmasters will be found in publications M-2229 and M-2110. And typical machining jobs, which they perform so efficiently, are illustrated on the next two pages. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

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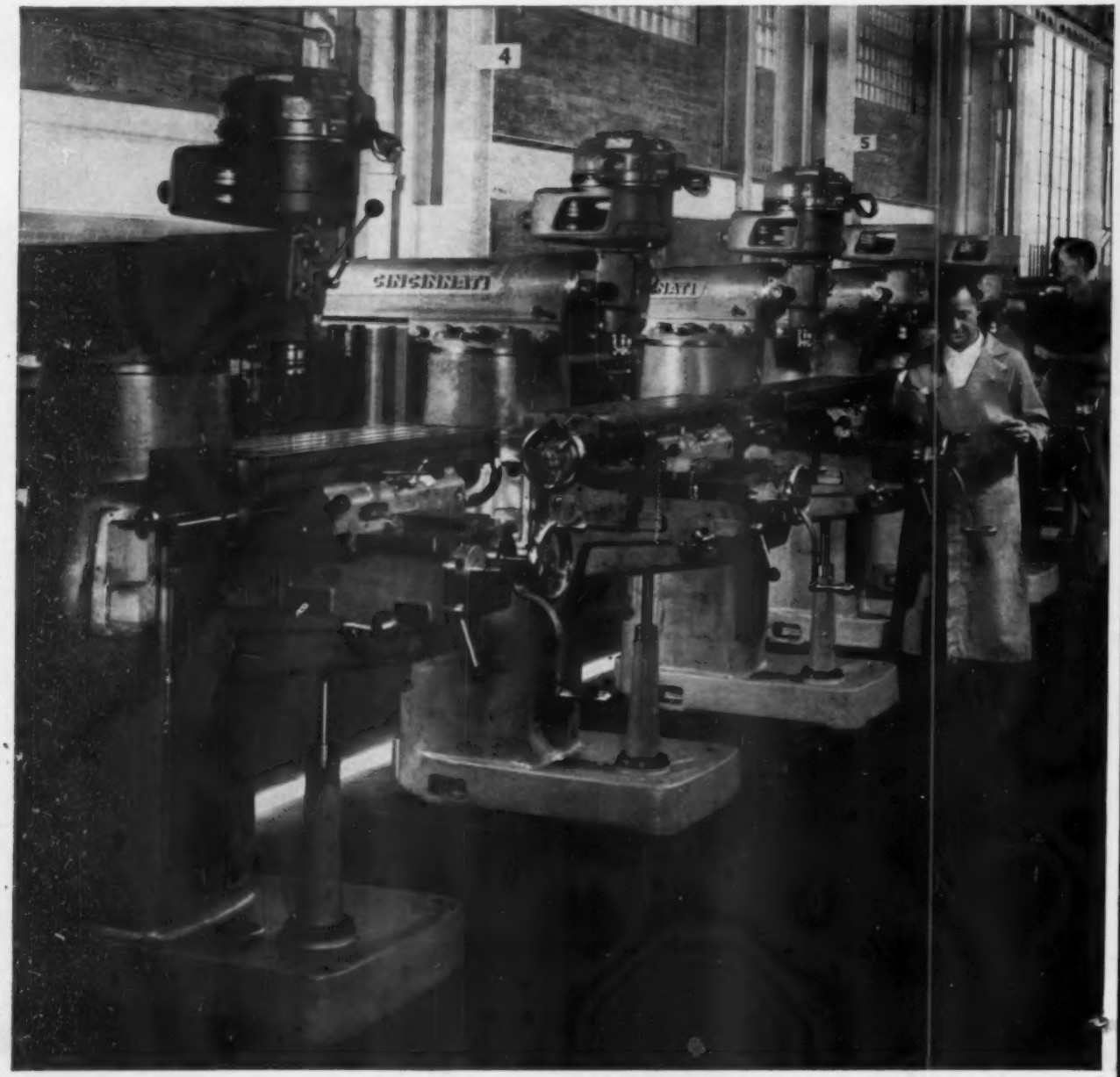

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KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES • CUTTER AND TOOL GRINDERS •

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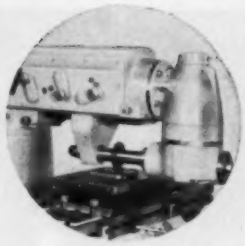
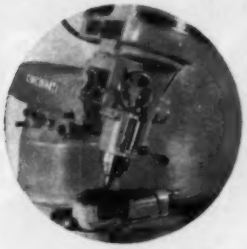
operations

Vertical Milling

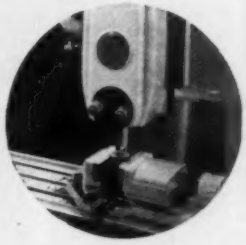


Horizontal Milling

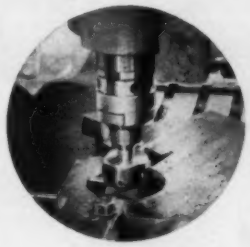
Drilling



Angular Milling



Shaping



Boring

—on various styles of

TOOLMASTER

MILLING MACHINES

A new idea in toolroom milling is outlined on the preceding page. Did you see it? It's well worth another look. This new idea extends versatility of the hard-working Toolmaster line still further through the addition of the H-V style, which performs horizontal as well as vertical milling operations.

All Toolmasters are ace-high in tool and die shops for handling a wide variety of light-duty vertical and angular milling operations, and drilling, boring and shaping operations as well. There are many reasons why Toolmaster is the machine favored for work within one or two hp classification: the knee is extra wide and square gibbed; graduated dials are the kind operators like, large and easy to read; oil-shot lubrication extends the productive life span of the machine; electrical controls are built-in; a variety of attachments is available, including an 8″ Index Head, built to Cincinnati's fine Dividing Head standards.

You will be highly pleased with Toolmaster performance. Want more information? Just write or telephone for a copy of Catalogs M-2229 and M-2110. **Milling Machine Division, The Cincinnati Milling Machine Co.,** *REdwood 1-2121.*

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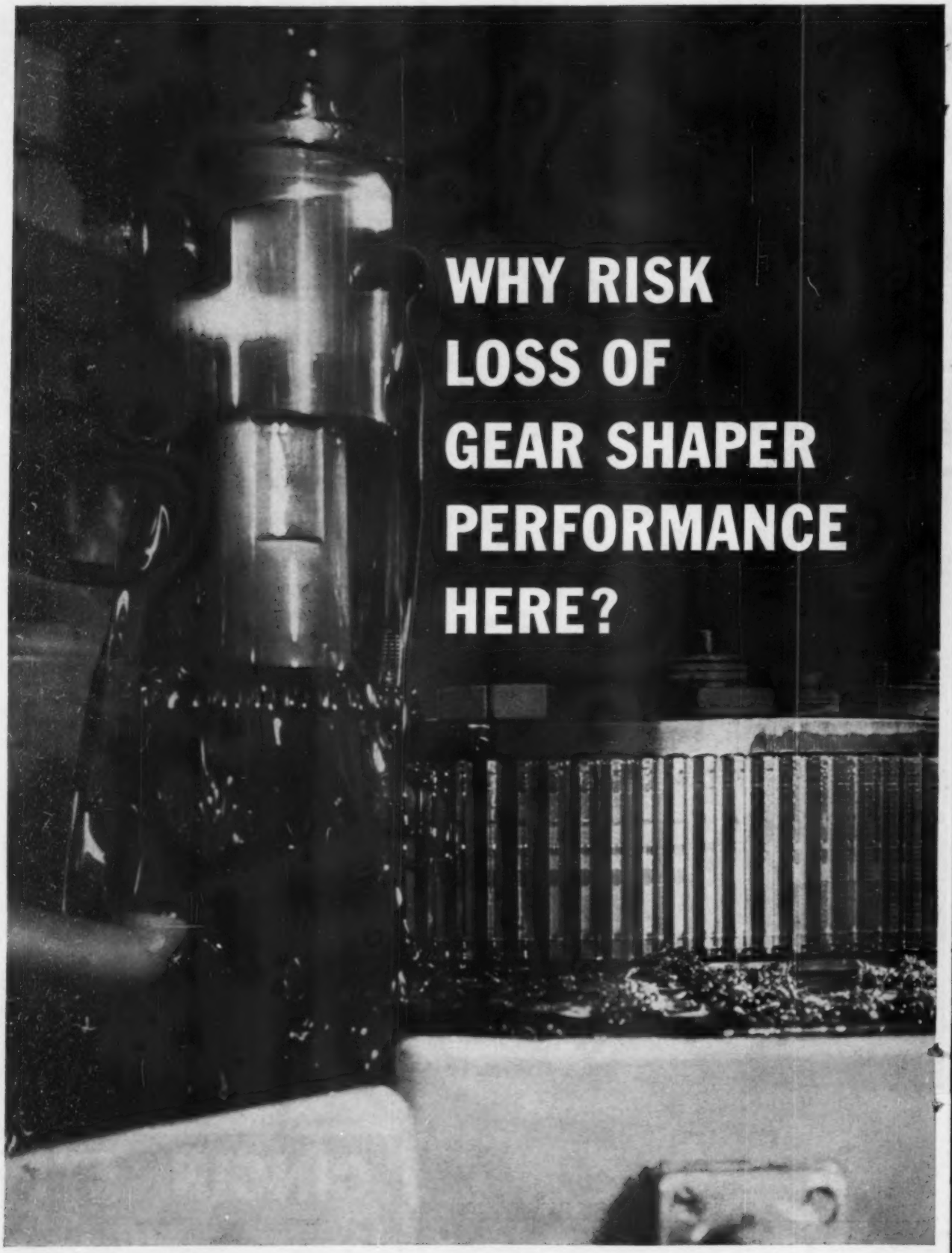
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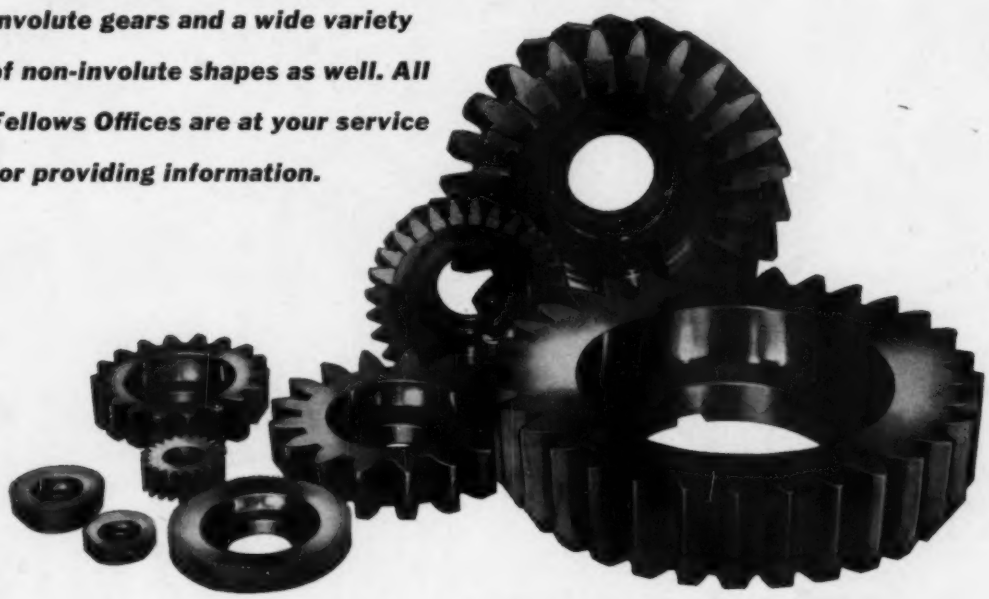

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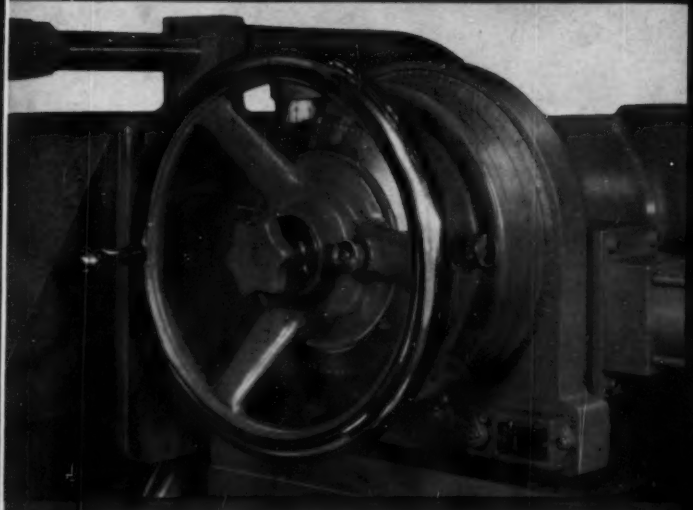
world leader in precision grinders

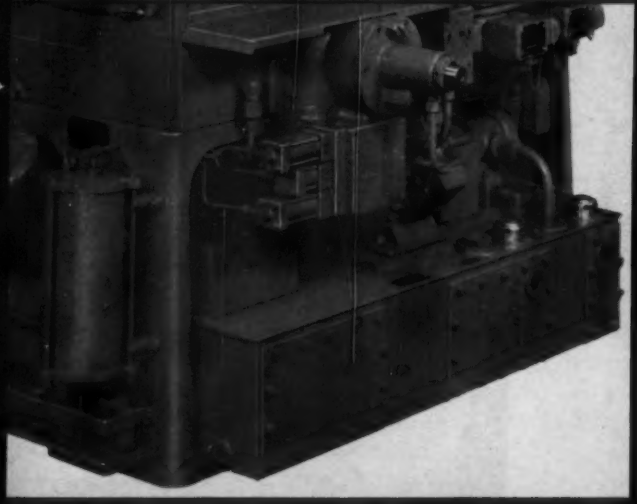
LANDIS TOOL COMPANY, WAYNESBORO, PA.

New shake free footstock with preloaded ball spindle eliminates shake. No need for adjustments because of wear.

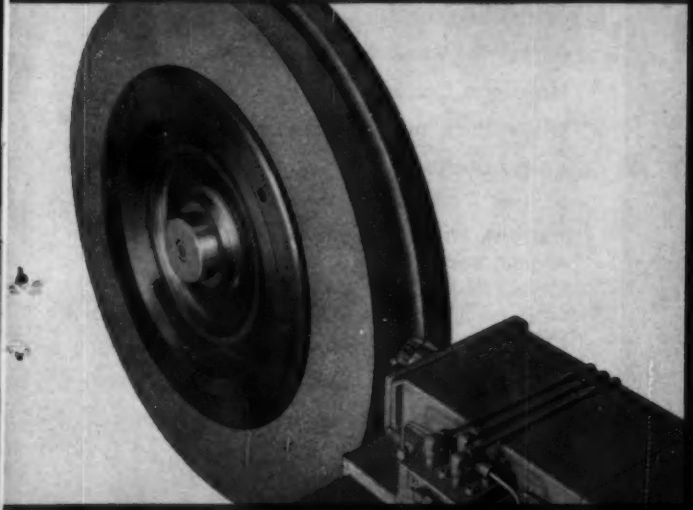
MICROFEED® . . . a fine increment feed to final size that consistently grinds to your closest tolerances. Extra equipment.



New eye level wheel feed with turning handwheel shows both rate and amount of feed on semiautomatic machines.



New isolated oil reservoir maintains machine alignment through better temperature control.



TRUFORM Wheel Dresser . . . preloaded ball slide design eliminates shake. Assures exact duplication of the profile on the wheel. Extra equipment.

Size Finder . . . a direct reading indicator used with Microfeed to reduce setup and grinding time in the grinding of multiple diameter shafts. Extra equipment.

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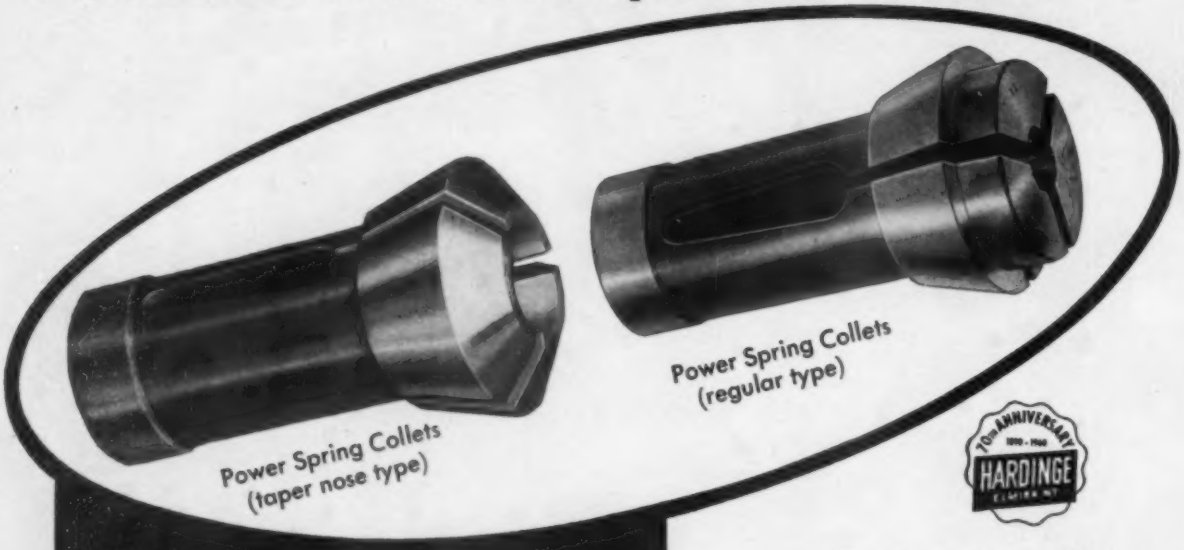
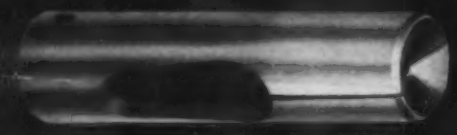
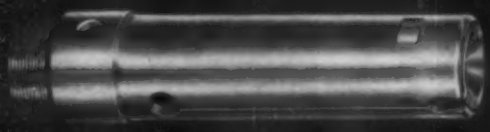
COLLETS and FEED FINGERS

For Brown & Sharpe Machines

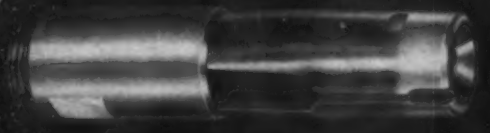




Feed Fingers (regular type)



Master Feed Fingers and Pads



Master Feed Fingers with Adjustable Tension for No. 00, 00G, 0 and 0G Machines.

To get maximum production efficiency from your Brown & Sharpe Machines — specify HARDINGE Collets and Feed Fingers.

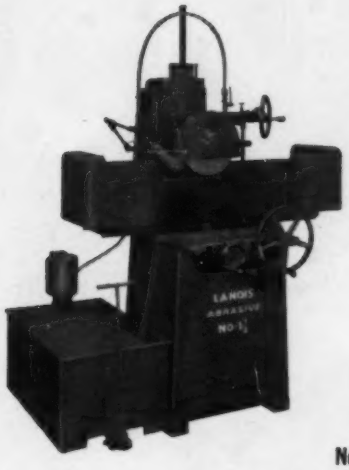
Specifically engineered, customer-shop tested and approved for Brown & Sharpe Machines, Hardinge Collets and Feed Fingers will reduce tooling costs and step up production.

Immediate Stock Delivery From:
Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles, New York, Philadelphia, Oakland, Minneapolis, St. Louis, Springfield, N. J., Rochester, N. Y., Portland, Seattle, Toronto.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

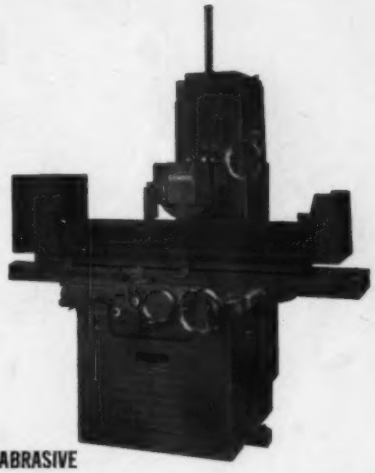
PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

the Landis line of precision surface grinders first for accuracy...first for value



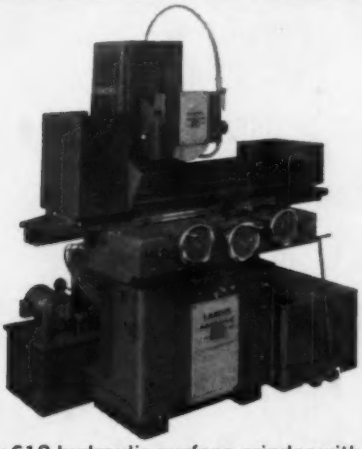
No. 1½

The most popular surface grinder for tool and die work. Hand operated with a 12" wheel for deep slot grinding, 1 hp motor and 10" x 15" worktable capacity. Shown with wet grinding attachment.



HYDRABRASIVE

Available in four sizes with 12" wheel and 3 hp motor, this hydraulic surface grinder is especially suited for general machine shops, production operations and tool shops.



No. 618

New 618 hydraulic surface grinder with power traverse, power crossfeed and power elevation to the wheel. Has 6" x 18" worktable capacity with 7" wheel and 1 hp motor or 12" wheel and 2 hp motor. Also available as hand operated machine.

18" FACE GRINDER

New hydraulic 18" face grinder for grinding workpieces requiring flat surfaces. Has 12" x 36" worktable capacity, 18" wheel and 15 hp motor. Also available as hand operated machine.

LANDIS

precision surface grinders

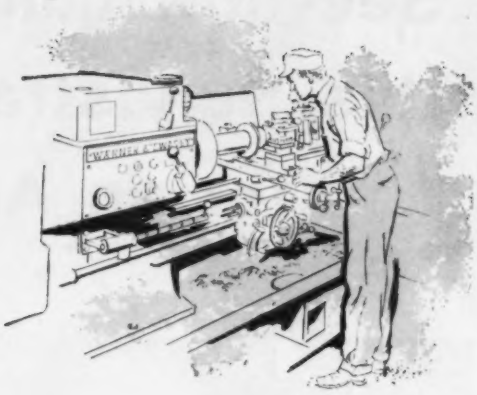
LANDIS TOOL COMPANY, WAYNESBORO, PA.

On the new No. 4 you can expect big reductions in handling time on jobs like these. Each machine in the Warner & Swasey line is individually designed for maximum efficiency and production in its own work range. As a result, operators like these machines for their easy handling and dependability in holding size.

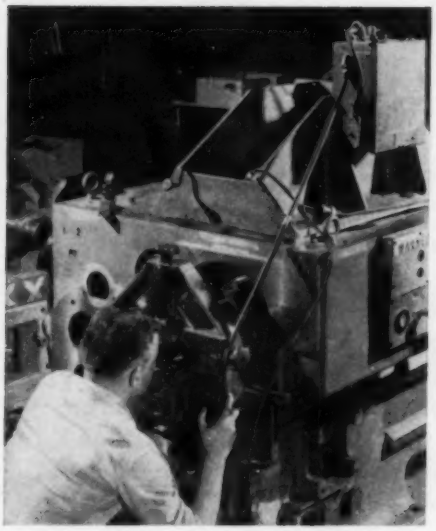
CIRCLE 163 ERADER SERVICE CARD

At B-I-F INDUSTRIES, INC.

Providence, Rhode Island



.0005" tolerances and 32 micro-inch finishes held in tough metals



Permanent Accuracy—inherent in a Warner & Swasey turret lathe—begins with this optical method for precise alignment of the spindle with the bedways. Elsewhere in the shop, W/S machinists depend on master fixturing, precision finishing operations and careful fitting to assure lasting accuracy in Warner & Swasey turret lathes.

Holding size and finishes like these is simplified by the smooth running headstock, easy handling and dependable accuracy of the Warner & Swasey No. 4 Turret Lathe.

B-I-F INDUSTRIES has found that the built-in accuracy and the many new features of their No. 4 Warner & Swasey turret lathe have helped to eliminate the extra finishing operations formerly required on the work. In addition to better work finish, the vibrationless, all-clutch headstock has contributed to longer cutter life.

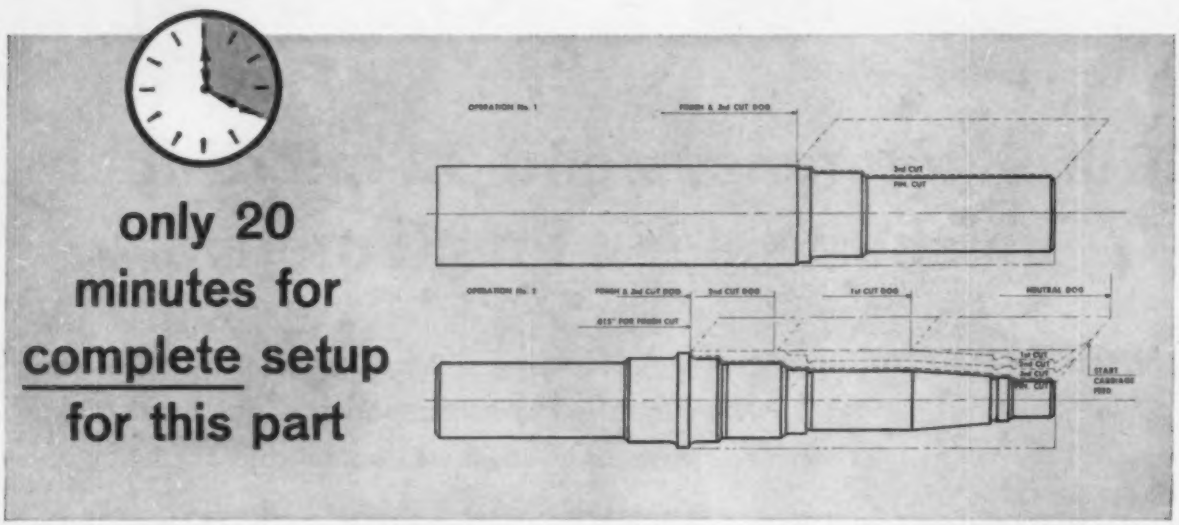
On small lots averaging 50 to 200 pieces—as well as on occasional lots of 3 or 4 pieces—their costs have been reduced because of the No. 4's higher speeds, greater horsepower, ease of setup and faster machine handling.

Why not check with your Warner & Swasey Field Engineer today for more information about the many new cost cutting features now available in our ram type turret lathes. Warner & Swasey Co., Cleveland 3, Ohio.

YOU CAN TURN IT BETTER, FASTER, FOR LESS
...WITH A WARNER & SWASEY

WARNER & SWASEY

See how quickly you can set up this Sundstrand Multi-Cut Lathe for an Automatic Cycle



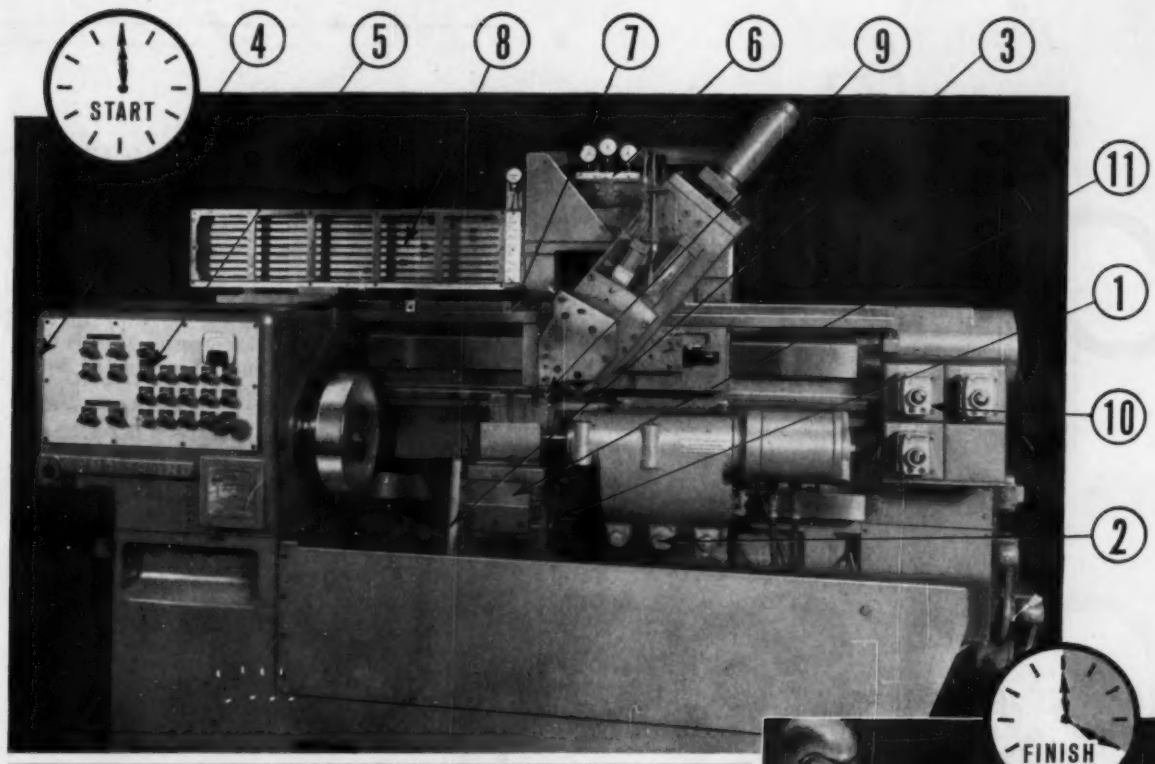
only 20 minutes for complete setup for this part

Fully automatic single-point tracer turning of short as well as long runs is practical and profitable with a Sundstrand Model 14T multi-cycle lathe. No machine of its class can be set up faster. You spend maximum time machining, minimum time getting ready.

The example given on these pages is typical of the ease and speed of *complete* setup. Everything that you need to do to get ready to machine a part is described here.

A single template, easily attached at the front of the machine and above the work, guides the tool for all ruff, semi-finish, and finish operations. No matching of cuts is required. The template stays in fixed position, does not have to be indexed for multiple cuts. Zero reference points for template, stroke and depth of cut settings reduce time for recorded or programmed set-ups.

For high production, low cost and precision accuracy, here is a machine you will want to evaluate. Complete details on request.



SETUP FOR OPERATION NO. 1

1. Position Facing Slide
2. Position Tailstock
3. Set Work Rest
4. Change Pick Off Gears
5. Position Carriage; Set Selector Switch (Rough & Fin.); Set Selector Switch (1 Ruff); Set Selector Switch (High Speed Fin.)
7. Mount Template
8. Set Dog Finish Cut; Set Dog 3rd Cut; Set Neutral Dog
9. Index Tool Point
10. Set Carriage and Facing Slide Feed Rate

SETUP TIME FOR OPERATION NO. 1 — 14 MINUTES

SETUP FOR OPERATION NO. 2

5. Set Selector — 3 Cuts; Set Selector Facing Slide; Set Selector Facing Slide 3rd Cut
6. Set Dial 1st Cut; Set Dial 2nd Cut
7. Mount Template
8. Set Dog 1st Cut; Set Dog 2nd Cut; Set Dog 3rd Cut; Set Dog Finish Cut
9. Index Tool Point
11. Set Facing Tool

SETUP TIME FOR OPERATION NO. 2 — 6 MINUTES

COMPLETE SETUP TIME—20 MINUTES

READY TO MACHINE!

OTHER COST-REDUCING BENEFITS OF SUNDSTRAND LATHES

- Adequate horsepower for maximum utilization of carbide or ceramic tools.
- Standard tools, insert or brazed-type, can be used throughout—no tooling inventory required for small-lot runs.
- Uniform stock removal for subsequent grinding or finishing operations
- Ruff and finish automatic cycle often makes possible elimination of green grinding.
- Rack adjustment for tailstock and facing carriage—scales simplify positioning of tailstock, facing slide, template, and control dogs.
- Easy front loading. Automatic loading and unloading can be readily applied.
- Infinitely variable feed.

SEND TODAY *for Bulletin No. 126 which gives complete information and specifications on Sundstrand 25 or 40-hp Model 14T multi-cycle hydraulic tracer lathes for lower cost machining of short- and long-run work.*

SUNDSTRAND

SUNDSTRAND MACHINE TOOL

BELVIDERE, ILLINOIS • Division of Sundstrand Corporation

In CASE after CASE after CASE after CASE

An automobile manufacturer in Michigan used Norton natural diamond wheels with resinoid bond, size 3¾ x 1½ x 1¼, type D11V9 for dry sharpening carbide tipped broaches. Compared to a competitive diamond wheel of similar specifications, the Norton wheel removed stock at a cost of $25.36 per cubic inch of carbide. Stock removal costs for the competitive wheel were $34.50 per cubic inch. The Norton wheel reduced grinding costs 26.5%.

A mid-western manufacturer of small gasoline motors used a Norton resinoid wheel having man-made diamond abrasive, size 6 x ¾ x 1¼, type D6A2C to wet-grind single point carbide tools. These Norton wheels, compared to another brand of similar type and description, provided twice the life of the competitive product.

A mid-western manufacturer of machine tools ran Norton resinoid wheels, of mined diamond, size 6 x ⅛ x 5/16 type D6A9 against a competitive wheel of comparable type and description for the dry grinding of carbide milling cutters. The Norton wheel lasted 521 hours compared to 300 hours for the other wheel. The Norton wheel provided 73.6% more usable life.

A western producer of aluminum used Norton resinoid-bonded diamond wheels of man-made abrasive to dry-grind carbide milling cutters. Wheel size was 5 x 1¾ x 1¼, Norton type, D11V9. Previously, the customer had been using a competitive wheel of similar specifications. The Norton wheel, compared to the other brand, cut faster and had twice the useful life.

Norton Diamond Wheels –Mined or Man-made– out-grind them all

Norton was first to introduce all three kinds of diamond wheel bonds: resinoid, metal and vitrified . . . does all its own checking and sizing of diamonds . . . duplicates wheel specifications with constant accuracy.

Resinoid bonded diamond wheels are best for such jobs as precision grinding of cutters, form tools and die blanks. They are available in several bond types — B type for wet grinding — B6 type for dry grinding.

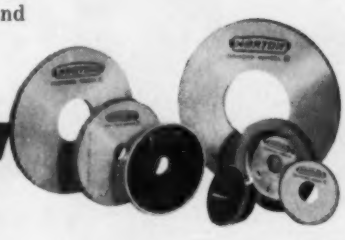
Vitrified bonded diamond wheels are used for sharpening single-point cutting tools, grinding chip grinders and for surfacing carbide dies.

Metal bonded diamond wheels are sometimes preferred for grinding chip breakers, for certain offhand grinding jobs and for cutting off sintered carbide blanks, etc.

Norton leadership in diamond wheel manufacture continues whether the diamonds used are natural or man-made.

As the world's largest producers of abrasives, Norton maintains the most modern equipment designed for product quality control. Expert engineering assistance and prompt deliveries are also geared to provide the wheels you need for top quality, lowest cost carbide grinding. For these helpful services, see your Norton Abrasive Engineer or Norton distributor. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON
ABRASIVES



W-1975

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEBB-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

GRAY was the first to recognize the unparalleled advantages of the Norden System of Numerical Control when applied to a Gray Horizontal Milling and Boring Machine or a Planer Type Milling Machine.

Gray was the first to introduce this superior control that was jointly developed by Gray and Norden.

Consider these salient features:

- Read-out. A visual display clearly indicating at all times the exact location of a machine tool element.
- Zero Off-set. Ability to establish zero read-out on the display at any predetermined reference point on the work piece. Operator then reads drawing dimensions on display unit.
- Work to closer accuracies. Overall accuracies within .001". Unaffected by line voltage.
- Greatest productivity over prolonged period. Replaceable modular construction facilities quick servicing.
- Progressive steps to full tape control. Each phase may be purchased individually.

The G. A. GRAY Co. Cincinnati, Ohio

Horizontal Milling and Boring Machines
Planers • Planer Type Milling Machines

the perfect combination for

large non-repetitive jobs

Here's real high speed

LAPOINTE *-BROACHING*

of these Babbitt-lined, half-round, steel-backed automotive type BEARING INSERTS

Glance at the two operations described across, and see if you think any conventional machining method could possibly give you such production! And then, realize that along with this broaching speed you get *high surface finish* . . . and dimensional accuracy on the finished part to an amazing *plus or minus one-and-a-quarter tenths* (.000125″)!

Lapointe accomplishes all this with two rugged broaching machines especially engineered for the job. Lapointe also designed and built the automatic, hydraulically operated in-and-out fixtures — and of course the broaching tools.

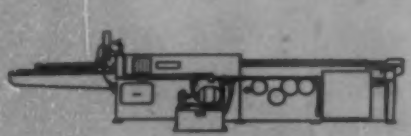
The greatest potential for cost reduction exists in the field of broaching — Lapointe has proved this statement hundreds of times. Plan now to improve your own production position by converting to Lapointe-Broaching. A qualified Lapointe Field Engineer will gladly discuss with you some of your *difficult* problems. Invite him in!

THE LAPOINTE MACHINE TOOL COMPANY

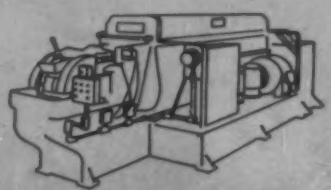
HUDSON, MASSACHUSETTS • U.S.A. *In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

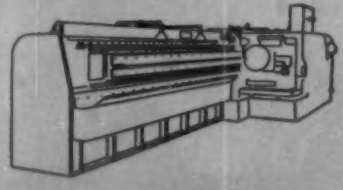
Lapointe-built Broaching Machines are available in hydraulic and electro-mechanical drives.



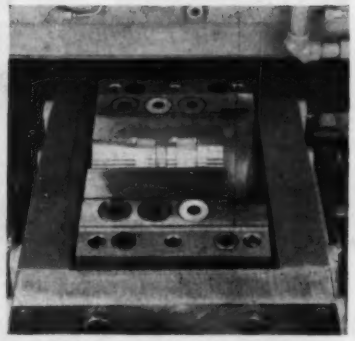
60″ STROKE HORIZONTAL, ELECTRIC



CH CONTINUOUS BROACHING, ELECTRIC



SRHE SINGLE RAM HORIZONTAL, ELECTRIC

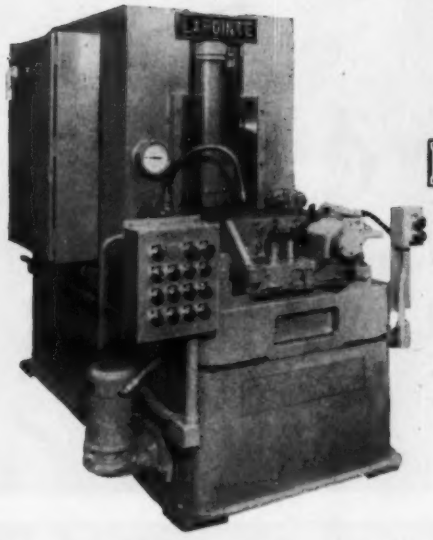


Automatic In-and-Out Fixture

OPERATION NO. 1

LAPOINTE-BROACHED, "to height"

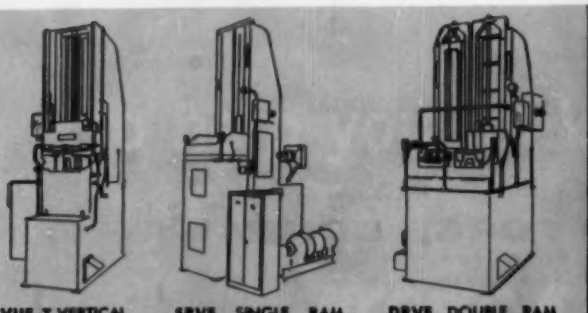
at rate of 800 parts per hour on this special high-speed Lapointe 5-ton Horizontal Hydraulic Broaching Machine using 24" stroke. Two inserts are broached at each cycle of machine.



OPERATION NO. 2

LAPOINTE-BROACHED, "half-round" and "crush reliefs"

at rate of 400 parts per hour on this special high-speed Lapointe Single Ram Vertical Broaching Machine with 18-inch stroke.



VUE-7 VERTICAL FULL-UP ELECTRIC

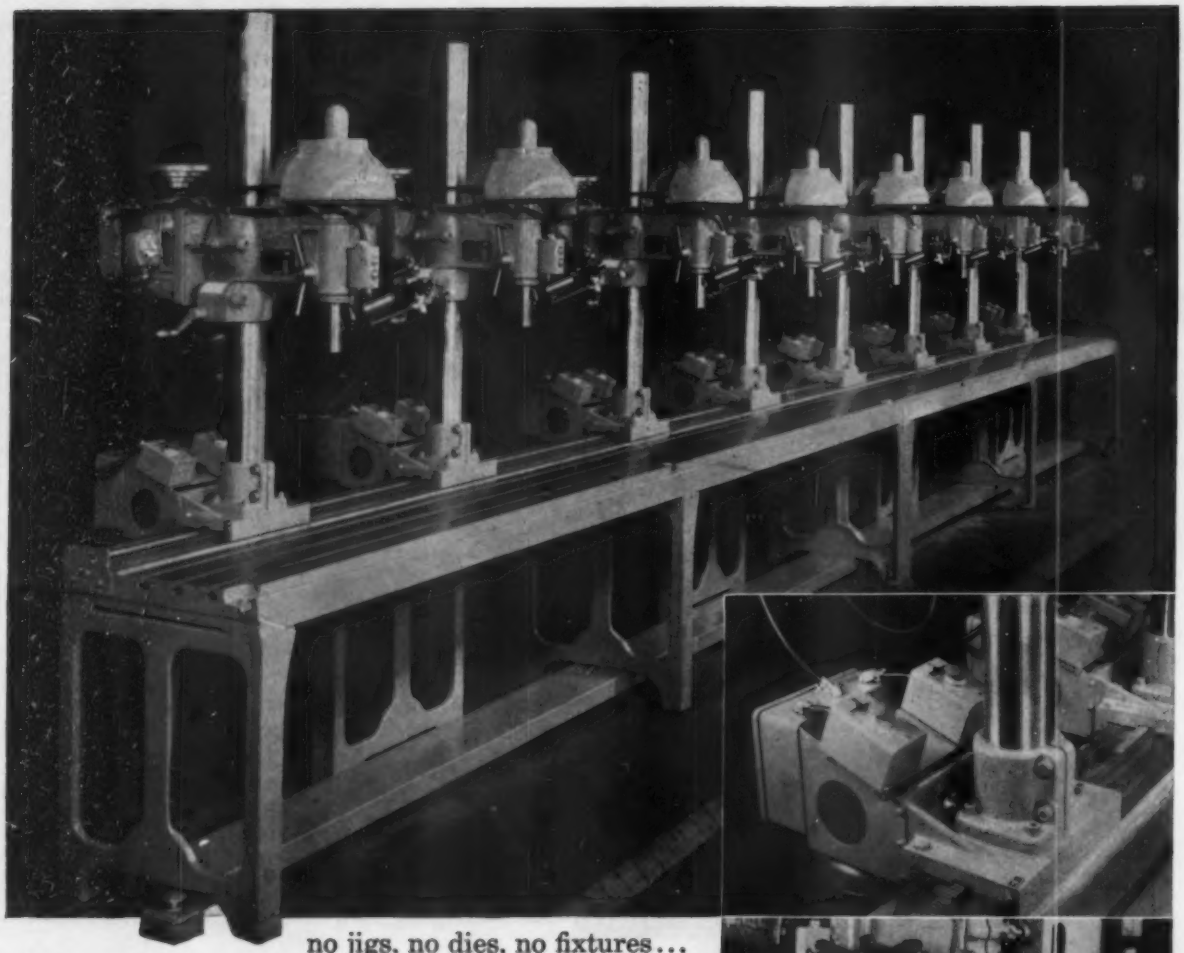
SRVE SINGLE RAM VERTICAL, ELECTRIC

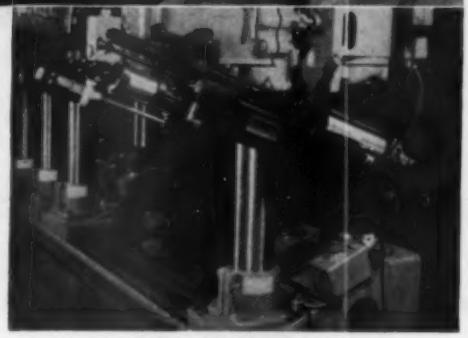
DRVE DOUBLE RAM VERTICAL, ELECTRIC

LAPOINTE

known to be the best in

BROACHING





no jigs, no dies, no fixtures...

29 holes at the touch of a switch!

Production drilling engineered by 'Buffalo'

PROBLEM: Drilling as many as 8 sets of holes in straight sections of aluminum channels to be formed into door and window frames, with varying hole patterns at exact locations to fit hardware and cross members of different size frames.

SOLUTION: A specially engineered 8-spindle 'Buffalo' No. 18 Drilling Machine with air-operated spindles and gear motor-positioned spindles mounted on 28-ft. T-slotted and dovetailed table. Two jogging push buttons on each head move it left or right to nearest $\frac{1}{16}$" by stainless steel scale and indicators. Thus heads may be set up quickly for any pattern with holes as close as 12¼". A single foot switch actuates all spindles simultaneously, though any air feeds may be locked out.

CONCLUSION: For fast, accurate, flexible drilling, there's a 'Buffalo' machine quality-built for the job, or 'Buffalo' can engineer one to your exact specifications. Let us know your problem!

TOP: Spindle closeup showing motorized racking device, scale and indicator.

BOTTOM: Showing air-operated spindle feed, rack, slide and clamping device.

MACHINE TOOL DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

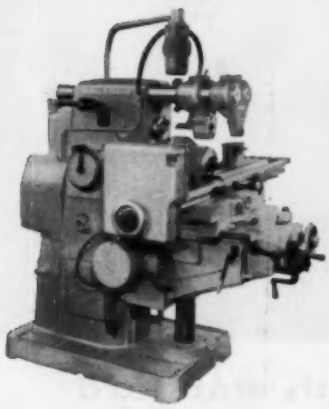
132

cost-cutting combinations

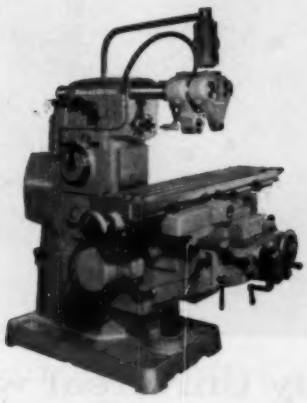
The new Brown & Sharpe DYNAMASTER knee-type Milling Machines

3-5-7.5 and dual 10/5 hp

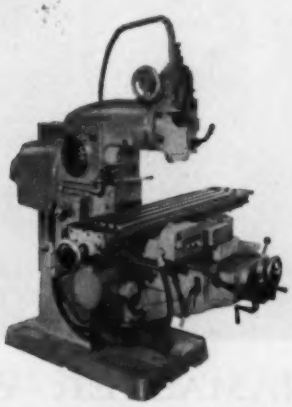
"Building block" design provides all wanted features — no more — no less — in "custom-built" combinations — at standard component costs



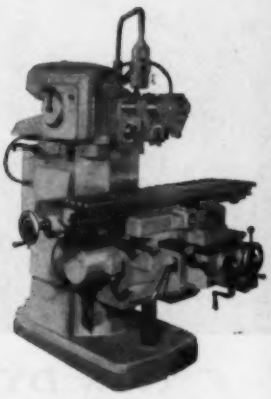
UNIVERSAL



PLAIN



VERTICAL



RANGEMASTER

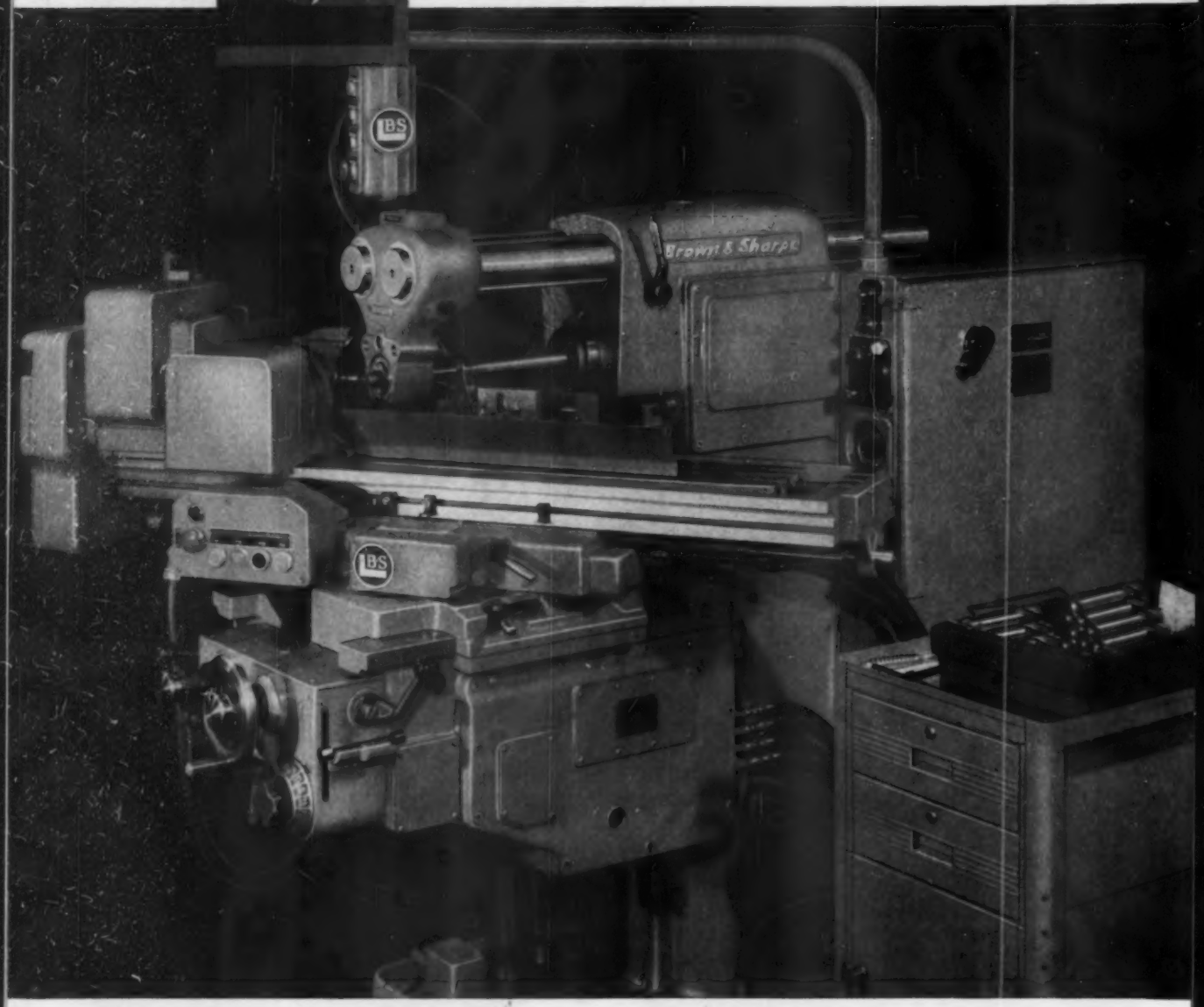
to help you make more for less...

Brown & Sharpe

PRECISION CENTER

MMT·PE

TO HELP YOU MILL MORE FOR LESS



New DYNAMASTER - only Universal with standard automatic cycle - saves cost of special machine

Work that requires a succession of helical milling cuts on parts produced in volume usually calls for a special automatic machine. Now you can get the same automatic production economy with the new Brown & Sharpe DYNAMASTER Universal, equipped with a standard automatic cycle arrangement, rise-and-fall knee positioning arrangement, and automatic indexing.

The standard "building block" construction of the new DYNAMASTER series permits you to buy a machine "custom-built" to your needs at the price of standard equipment.

Before you buy milling machines for toolroom, experimental work, repair department, or production, get the complete story of the 27 design improvements, with 9 cost-saving advantages available only in a DYNAMASTER. Universal, Plain, Vertical, and Rangemaster . . . 14 models. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

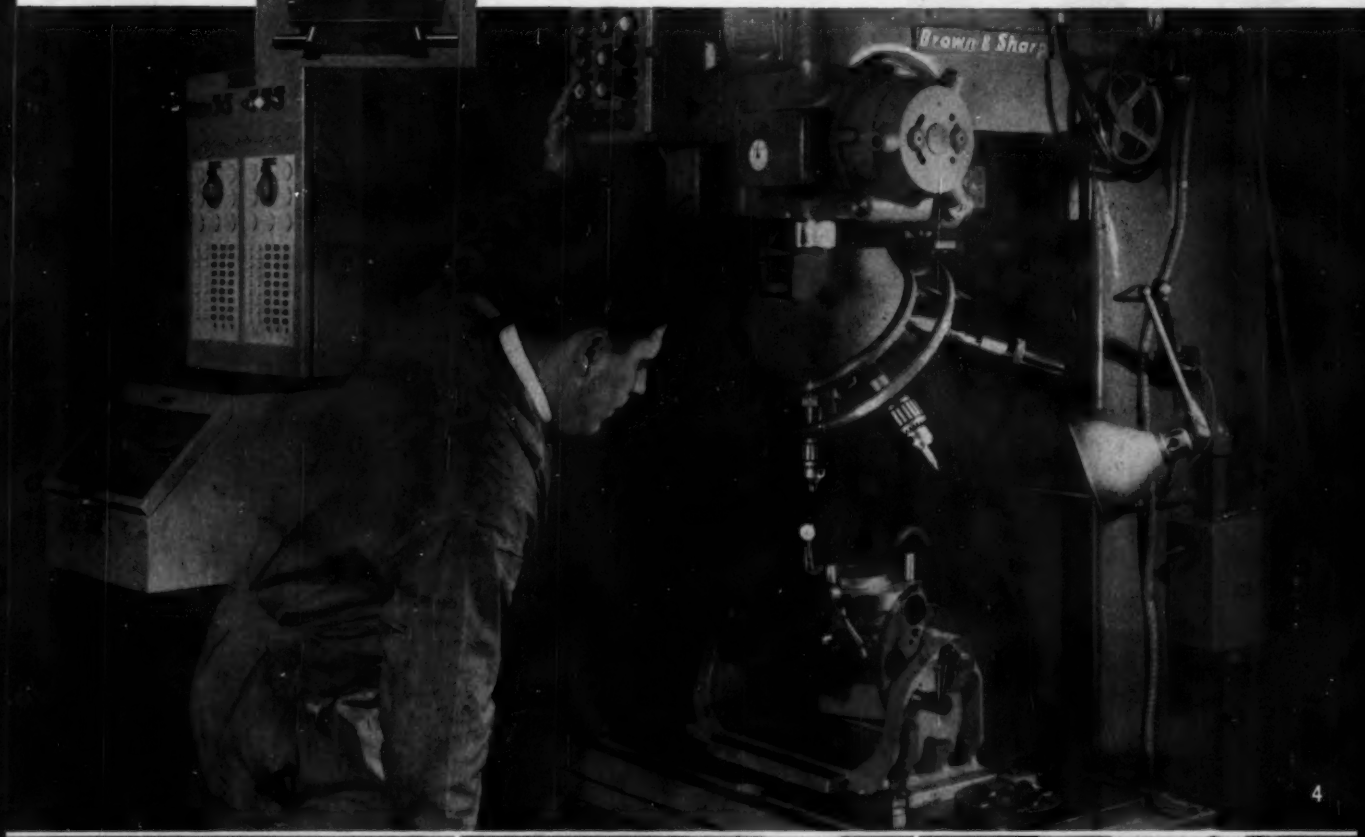
THE AUTOMATIC MILLING CYCLE is established by setting the table dogs. Operations are completely automatic, freeing operator after workpiece has been loaded and machine started. Machine stops automatically when all cuts are completed. Rise-and-fall knee positioning arrangement drops table 1" to provide clearance required during run back in helical milling. A special arrangement provides automatic indexing of the spiral head. A simple selector switch permits quick changeover from auto-indexing to manual control, when required, for short runs or special jobs.

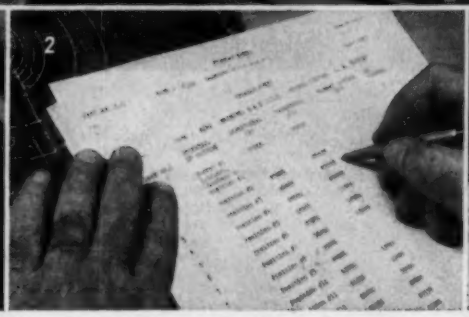
Brown & Sharpe PRECISION CENTER

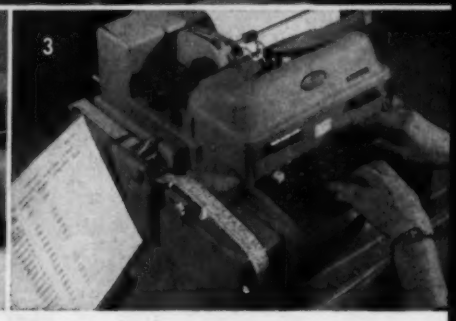
CIRCLE 175 READER SERVICE CARD

MMT·PE

TO HELP YOU DRILL AND TAP MORE FOR LESS







TURR-E-TAPE "simplimates" conversion to tape control—four easy steps start savings as high as 80%

Have you rejected tape control because you believe conversion is a complex procedure, requiring big investment in auxiliary equipment, and expensive, skilled personnel? If so, you have a welcome surprise ahead.

Four simple steps, and the TURR-E-TAPE, a tape-controlled Brown & Sharpe Model B Turret Drilling Machine, automatically performs a series of drilling, tapping, and boring operations in work moved automatically to hole locations on a B&S Positioning Table. Tooling costs can be virtually eliminated, and you also save on skilled labor costs and nonproductive time.

If your production requires numerous short runs of parts, or long runs of parts used a few at a time—find out how much you can save . . . and why, with the TURR-E-TAPE, conversion means "simplimation." For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

You start with a drawing (1) just as in conventional machining. Preparing the process sheet, step (2), requires no special skill. Tape preparation, step (3), is a commonplace assignment today. Step (4) requires only the proper location of work, with reference to table position. Four easy steps — then TURR-E-TAPE takes over, and you start saving. B&S Turret Drilling Specialists will analyze your operations and furnish a complete cost report at your request.

Brown & Sharpe PRECISION CENTER

CIRCLE 176 READER SERVICE CARD

New DYNAMASTER - only Universal with standard automatic cycle - saves cost of special machine

Work that requires a succession of helical milling cuts on parts produced in volume usually calls for a special automatic machine. Now you can get the same automatic production economy with the new Brown & Sharpe DYNAMASTER Universal, equipped with a standard automatic cycle arrangement, rise-and-fall knee positioning arrangement, and automatic indexing.

The standard "building block" construction of the new DYNAMASTER series permits you to buy a machine "custom-built" to your needs at the price of standard equipment.

Before you buy milling machines for toolroom, experimental work, repair department, or production, get the complete story of the 27 design improvements, with 9 cost-saving advantages available only in a DYNAMASTER. Universal, Plain, Vertical, and Rangemaster . . . 14 models. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

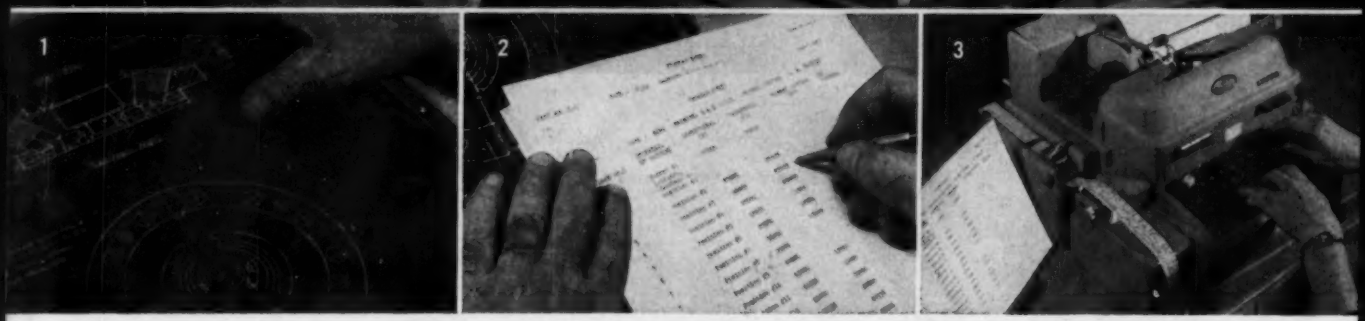
THE AUTOMATIC MILLING CYCLE is established by setting the table dogs. Operations are completely automatic, freeing operator after workpiece has been loaded and machine started. Machine stops automatically when all cuts are completed. Rise-and-fall knee positioning arrangement drops table 1" to provide clearance required during run back in helical milling. A special arrangement provides automatic indexing of the spiral head. A simple selector switch permits quick changeover from auto-indexing to manual control, when required, for short runs or special jobs.

Brown & Sharpe PRECISION CENTER

CIRCLE 175 READER SERVICE CARD

MMT-PE

TO HELP YOU GRIND MORE FOR LESS



TURR-E-TAPE "simplimates" conversion to tape control—four easy steps start savings as high as 80%

Have you rejected tape control because you believe conversion is a complex procedure, requiring big investment in auxiliary equipment, and expensive, skilled personnel? If so, you have a welcome surprise ahead.

Four simple steps, and the TURR-E-TAPE, a tape-controlled Brown & Sharpe Model B Turret Drilling Machine, automatically performs a series of drilling, tapping, and boring operations in work moved automatically to hole locations on a B&S Positioning Table. Tooling costs can be virtually eliminated, and you also save on skilled labor costs and nonproductive time.

If your production requires numerous short runs of parts, or long runs of parts used a few at a time—find out how much you can save . . . and why, with the TURR-E-TAPE, conversion means "simplimation." For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

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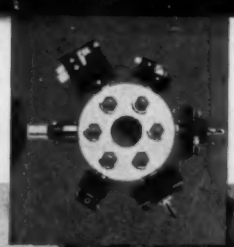
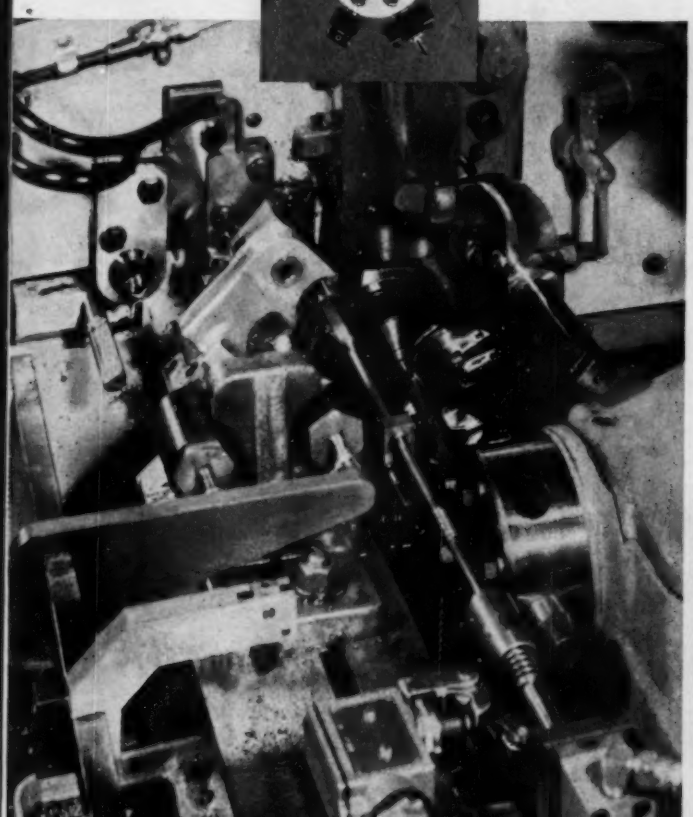
Brown & Sharpe PRECISION CENTER

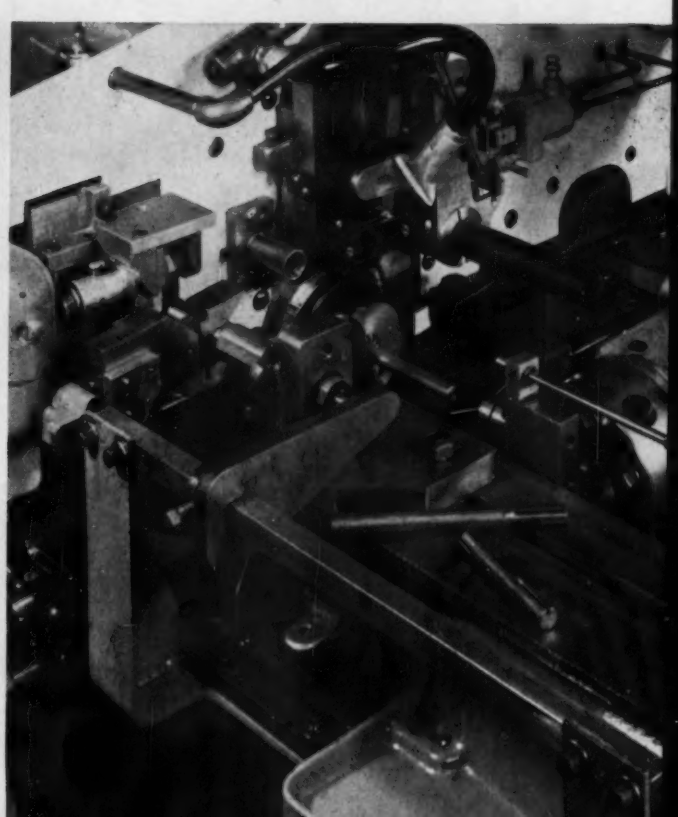
CIRCLE 176 READER SERVICE CARD

MMT·PE

ASK ABOUT THE $500 TRADE-IN ALLOWANCE ON OLD B&S AUTOMATIC SCREW MACHINES

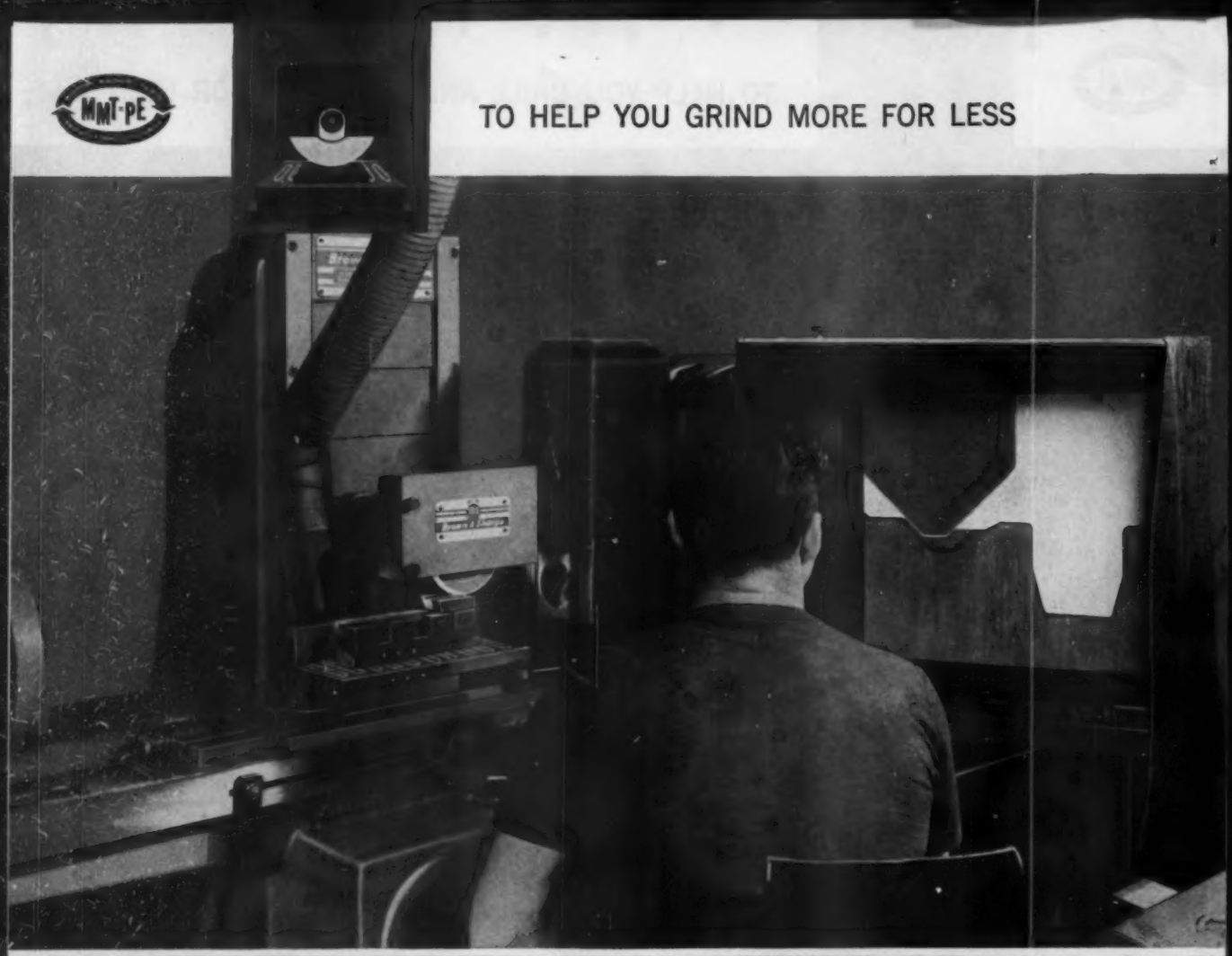






MMT-PE

TO HELP YOU GRIND MORE FOR LESS



Previous time
25 hrs.
With Visual Grind
4 hrs.

Carbide insert forming tools are ground with 5 microinch finish to provide specified 12 microinch finish on piece. Accurate grinding of blending radii in form was extremely difficult before — is now no problem with Visual Grind.

Previous time
20 hrs.
With Visual Grind
7½ hrs.

Carbide forming tools ground 6 times faster with VISUAL GRIND... steel tools 4 times faster

Olson Mfg. Co., Worcester, Mass., makes screw machine products in large variety and volume. For reducing costs of the many forming tools required, Olson relies on the B&S MICROMASTER Surface Grinding Machine equipped with VISUAL GRIND. Time-saving over former method is up to 90% for carbide tools, and up to 75% for steel.

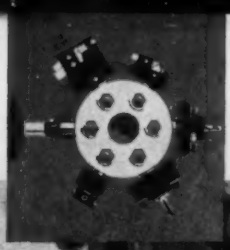
With VISUAL GRIND the comparator is built in. There is no time lost removing work for frequent inspection with separate equipment. The operator easily "follows the line," and matches the true image of the work to the form layout drawing mounted on the screen. Any contours can be reproduced with a few simple wheels — reducing wheel costs. Find out how much you can save on punches, dies, and similar forms — with through, blind, or template grinding. For details write: Machine Tool Div., Brown & Sharpe Mfg. Co., Prov. 1, R. I.

The VISUAL GRIND® optical system, manufactured by Cleveland Grinding Machine Co., is available only combined with the B&S 618 MICROMASTER. The complete "package" is sold and serviced by Brown & Sharpe. It can be used for other grinding of surfaces up to 6" x 12", without disturbing the optical system.

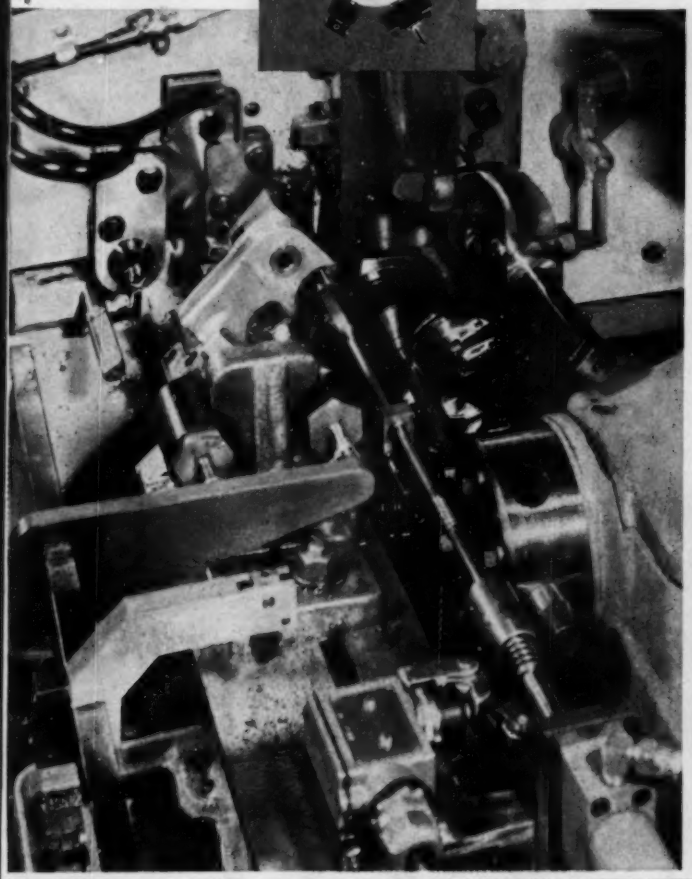
Brown & Sharpe PRECISION CENTER

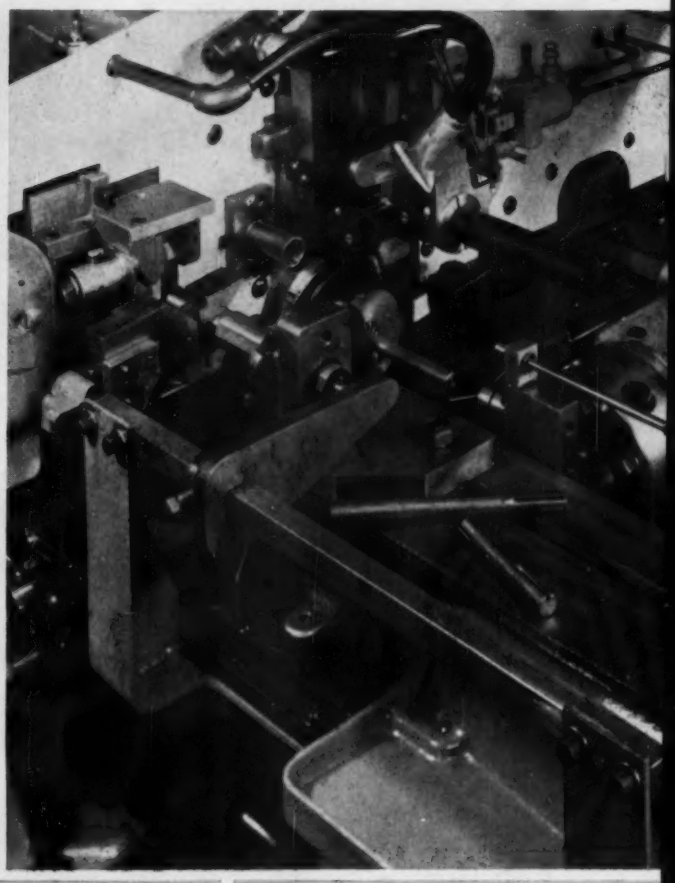
CIRCLE 177 READER SERVICE CARD

MMT-PE

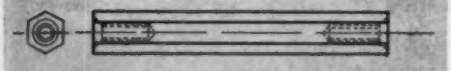


ASK ABOUT THE $500 TRADE-IN ALLOWANCE ON OLD B&S AUTOMATIC SCREW MACHINES



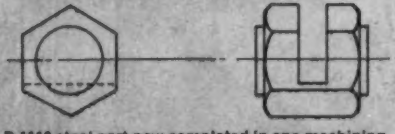


90% SAVING in production time



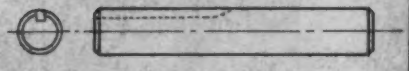
Cold drawn steel part now completed in one machining cycle on No. 2 Automatic with special Rear-end Drilling and Tapping attachment. Formerly, after blanking out on Automatic, second operation on hand machine was required to center, drill, and tap hole at back end.

80% SAVING in production time



B-1110 steel part now completed in one machining cycle on No. 2 Automatic equipped with standard Cross Milling attachment. Formerly, after blanking out on Automatic, second operation was required to mill the slot.

55% SAVING in production time



Cold rolled steel part now completed in one machining cycle on No. 2 Automatic equipped with special Keyway Milling attachment. Formerly, after blanking out on Automatic, second operation was required to mill the keyway.

New attachments extend job range of B&S Automatics - eliminate second operations - reduce cost 50% or more

An unlimited variety of parts that require unusual slotting, milling, drilling, or tapping operations can now be completely machined from the bar on Brown & Sharpe Automatic Screw Machines. Many new attachments, standard and special, can be used to eliminate second operations.

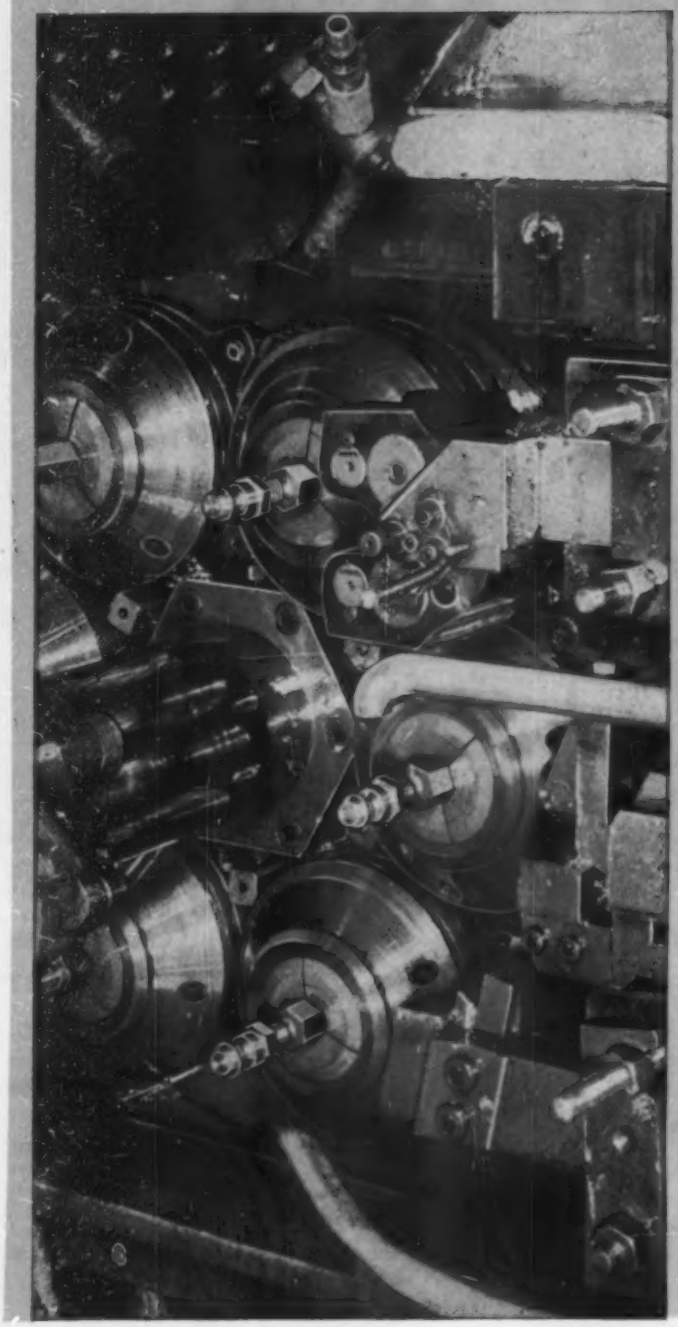
Cost reductions as high as 90% are frequently obtained, and fewer machines are required. Along with these big savings, the new design Brown & Sharpe Automatics maintain close tolerances for size and concentricity, and meet the highest standards for surface quality.

Find out how you can use B&S Automatics and attachments to trim down the cost of parts that now require extra machining. For complete information, write: Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

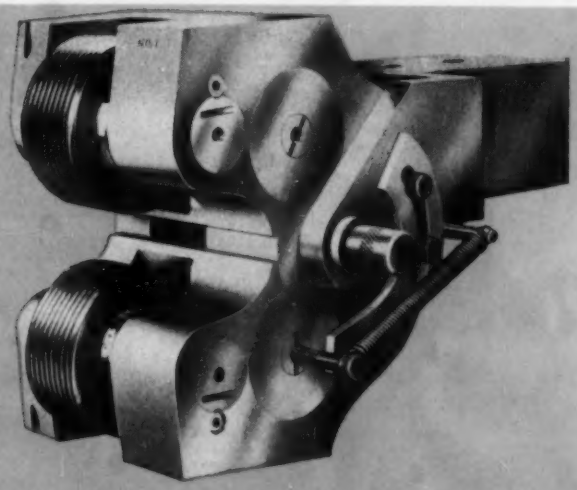
The three jobs shown above are examples of unlimited opportunities for cost-reduction by using B&S attachments to combine more operations within the bar machining cycle. Thirty standard attachments are available for B&S No. 00 and No. 2 Automatics, and special attachments are designed as needed. Let B&S Screw Machine specialists survey your operations and recommend new set-ups for work-hour savings.

Brown & Sharpe PRECISION CENTER

CIRCLE 178 READER SERVICE CARD



thread roll cost only 16½¢ per thousand pieces



The LANROLL Thread Rolling Attachment once again has proved its money-saving value . . . this time thread rolling clutch shaft parts at the AL-KEN Manufacturing Co. in Hudson, Mich.

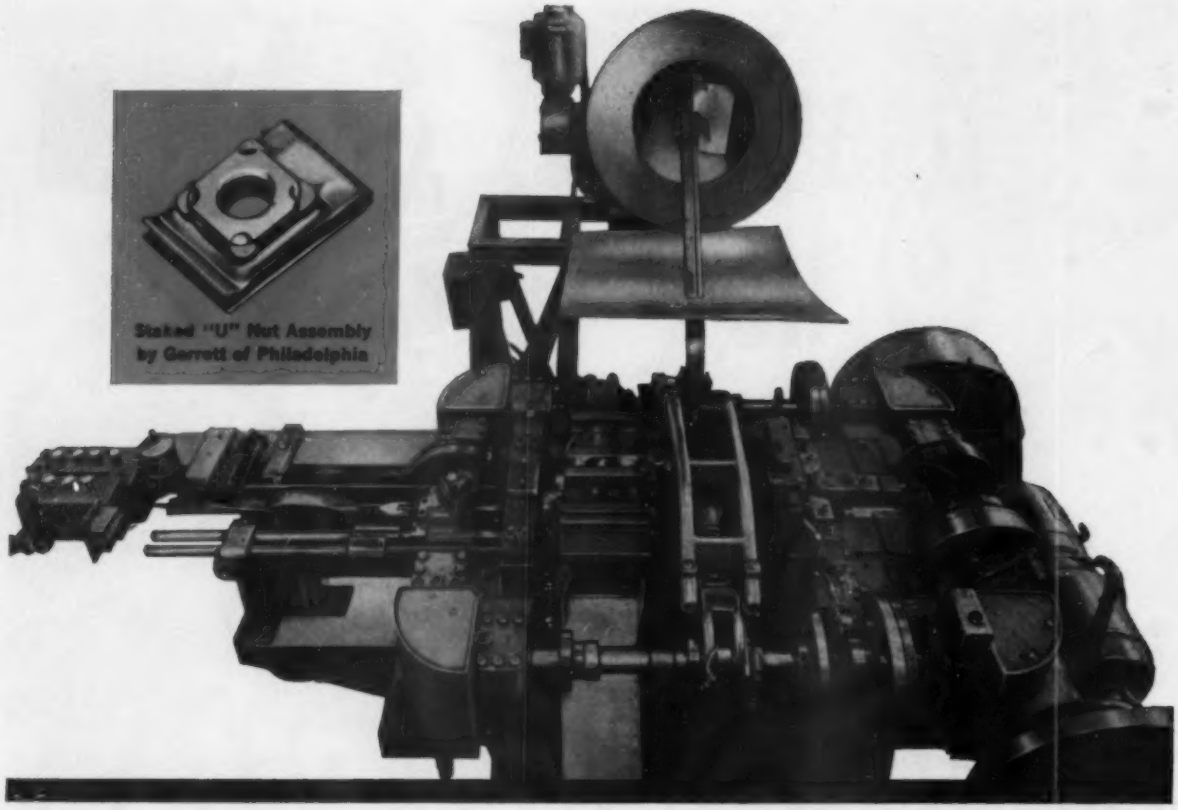
In this operation, the 18GA LANROLL Attachment is mounted at the fifth position of a 1¼" Six-Spindle Conomatic and thread rolls ½", 13 pitch, UN, Class 2A, ⅝" long threads on B1113 bar stock. Using only one set of rolls a direct cost of 16½¢ per thousand was realized in rolling 250,000 pieces.

Long roll life is but one benefit with the specially stabilized LANROLL Attachment. It also allows rolling of coarse pitch threads to Class 4 tolerances, and will roll threads directly to a shoulder with safety and excellent microstructure of the rolled thread. Other leading features of the Attachment, designed to produce right- or left-hand, straight or taper threads, include: wide range coverage, precise adjustment, attachment tipping to avoid indexing interference, and set-up ease. Primarily designed for application to bar automatics, the LANROLL Attachment can also be installed on the cross slide of a lathe provided power feed is used. For more information ask for Bulletin G-96.

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT



U.S. symmetrical Multi-Slide® produces staked "U" nut assemblies in one operation!

The No. 33 U. S. Symmetrical Multi-Slide shown above—one of the many in use by The George K. Garrett Company, Inc., of Philadelphia, is producing Garrett's Staked "U" Nut Assembly. Conventional production of this assembly requires 3 separate operations . . . stamping of blank, assembling and staking before forming, and finish forming.

Now, with the U. S. No. 33 Symmetrical Multi-Slide, the 3 operations are combined and performed by this one U. S. Multi-Slide—which produces complete, Staked "U" Nut Assemblies at the rate of 140 per minute.

This is another example of the cost reduction and time saving advantages U. S. Multi-Slides can and do make possible.

Write for full information on U. S. Multi-Slides —ask for Bulletin No. 15. A

MULTI-SLIDE

U.S. TOOL COMPANY, INC.

AMPERE (East Orange) NEW JERSEY

U. S. Multi-Slides® • U. S. Multi-Millers® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories

If the J & L turret lathe insert is missing, write JONES & LAMSON, 502 Clinton St., Springfield, Vermont, for your copy.

Tear it out for your files

Highlights from today's most progressive line of cost-cutting turret lathes and optical comparators . . .

Like all J & L machines and equipment, the products shown on the following pages are available through J & L's "Profitivity" leasing arrangements. No down payment or deposit is required. An hourly rate of $2.50 per $20,000 machine value puts J & L **profitable** productivity into your plant. Send coupon below for complete information.

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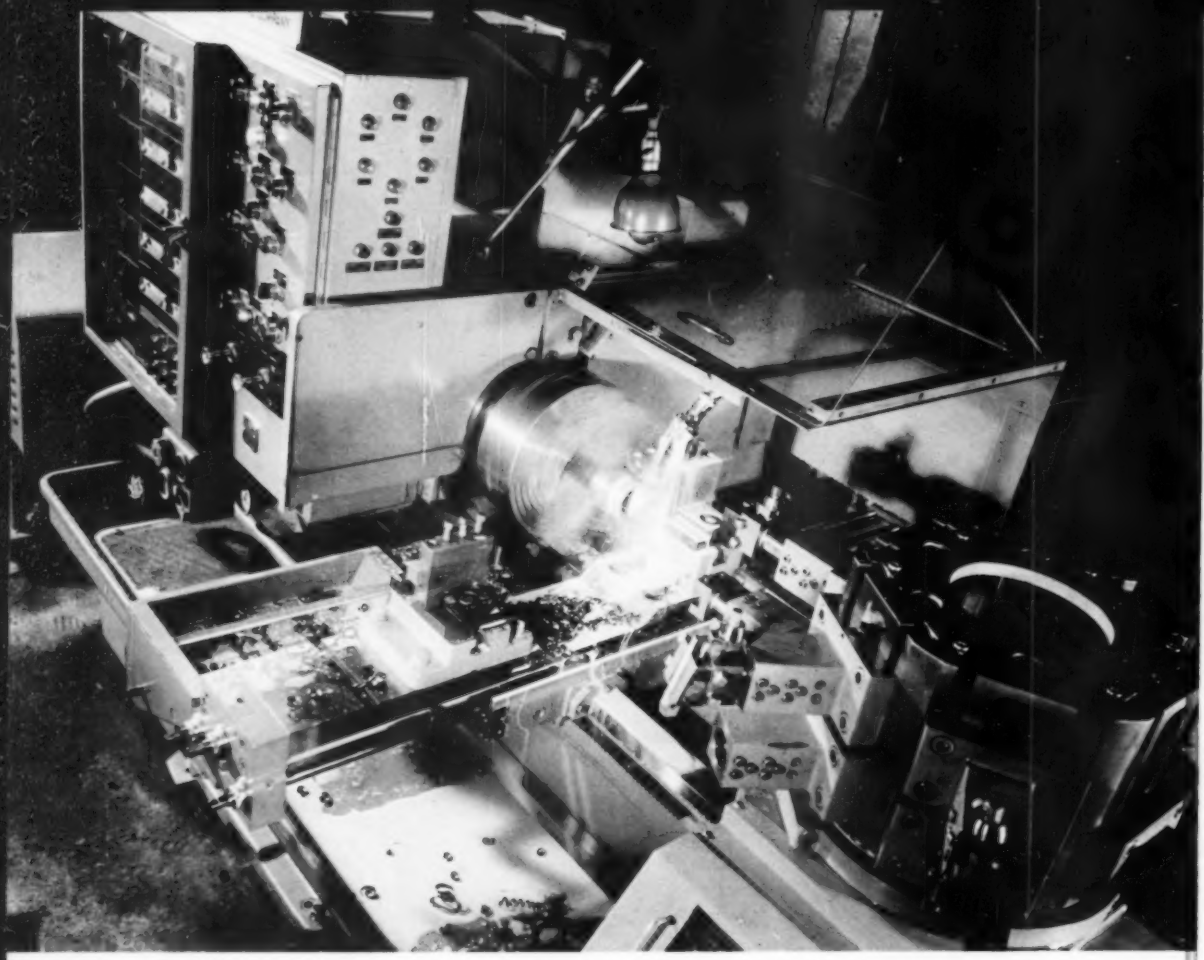


NEW ATL AUTOMATIC TURRET LATHE

Push Button Programming. Fast, Snappy Machine Action. Rugged Capacities for Both Bar and Chuck Work.

This new turret lathe is specifically designed to package the maximum benefits of automatic turret lathe operation. For instance, it has the rugged capacities of a solid saddle type turret lathe (no ram overhang). Combined with this rigidity is extremely fast, positive machine action (rapid traverse of the saddle is 500″ per minute and turret indexing, fully tooled, is less than 7 seconds through all six stations).

Machine programming is simple and versatile. The staging panel, conveniently mounted on the machine, consists of clearly labeled push button controls and selector dials for motion sequences, speeds, and feeds.

The ATL is a single package machine design. All components including controls, motors, hydraulics, coolant and electrical circuits are assembled into a compact machine unit; completely interconnected in all respects and ready for shipment, or moving.

The ATL provides up to 40 H.P. for either a 12- or 24-speed automatic headstock. Speed ranges are available with a maximum speed of 2000 RPM. Fifteen feeds are provided for both saddle and cross-slide, with a maximum of 15″ per minute on the cross-slide and 30″ per minute on the saddle.

The high hexagon turret provides added tooling versatility and simplified tool setting. This turret is used primarily for chuck work although the machine itself is easily converted for either chuck or bar work.

The ATL has rigidity to spare. It has hardened-and-ground steel bedways, a full 14½″ stroke on the cross-slide with positive stops, and all other design refinements associated with the accuracy and dependability of Jones & Lamson turret lathes.

LO-6107

CONTROLS and How to Use Them

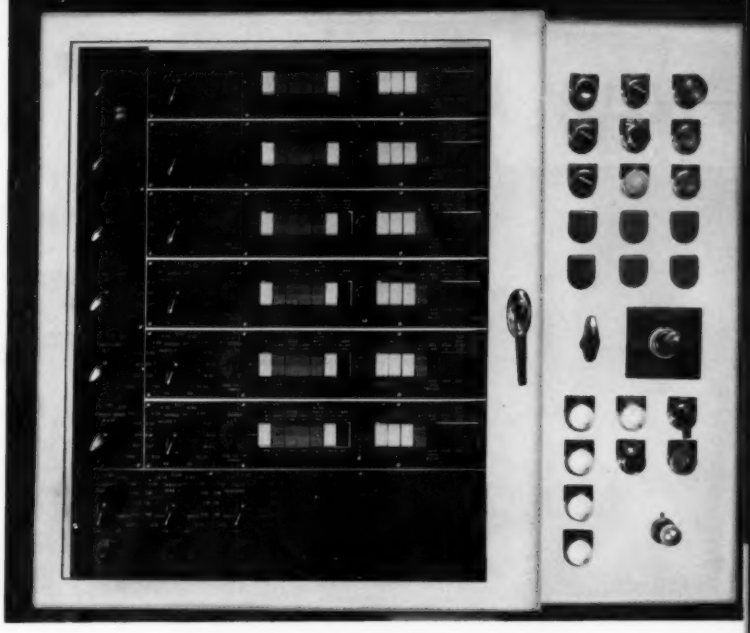
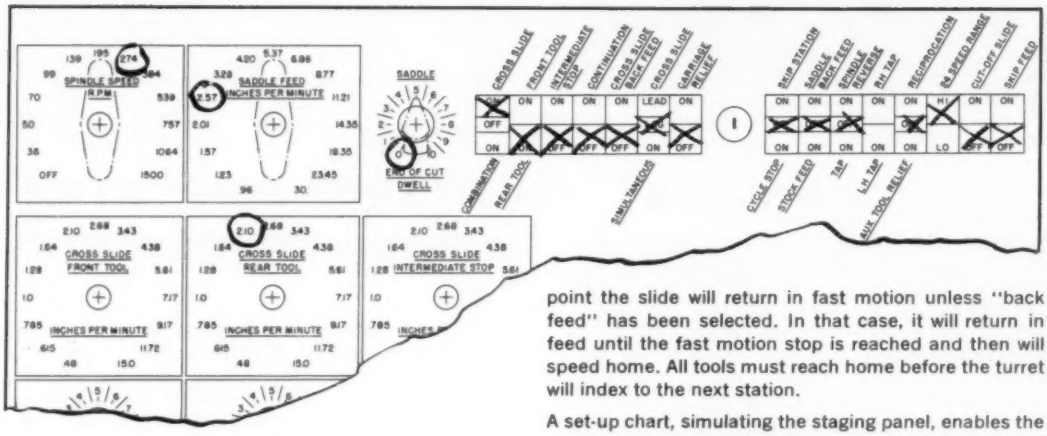


FIG. 1



The ATL may be programmed for completely automatic operation of a variety of machining cycle sequences. These include: bar-feed advance, collet "close" and "open", turret index, rapid traverse for cross-slide and saddle, back-feed, cross-slide lag, cross-slide lead, continuation, intermediate stop, combination cross-slide and saddle, spindle reverse, independent feed rate for each turret face, independent feed rate for front and rear of cross-slide, independent spindle speed for each turret face, independent dwell for front or rear of cross-slide and each turret face.

The cycle chosen can be either manual or automatic. It may be set for a single cycle or to repeat for multiple automatic cycles.

In addition, controls are available to manually traverse the saddle forward and reverse (joy stick); manually traverse the cross-slide in and out (joy stick); to manually engage the spindle in forward, reverse, jog or free position; and to open and close power chucks.

All of this programming is performed through a single staging panel. Clearly labeled push buttons and selector dials enable the operator to select a variety of cycle motions from each hexagon turret position. Dials provide individual, speed, feed and dwell selection for each tooling station. Tool carrying members are always in fast motion until the fast motion stop is engaged. They then automatically go in to feed. When the tool reaches end point the slide will return in fast motion unless "back feed" has been selected. In that case, it will return in feed until the fast motion stop is reached and then will speed home. All tools must reach home before the turret will index to the next station.

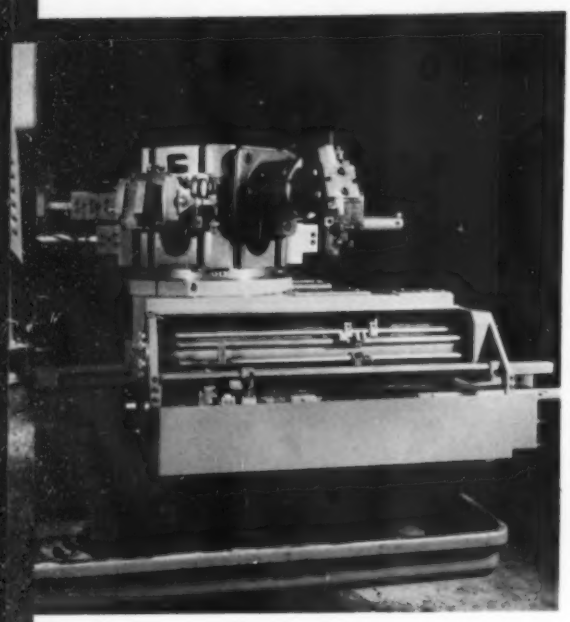
A set-up chart, simulating the staging panel, enables the operator to program machining sequences in a matter of minutes. Speeds, feeds and dwell are shown for each tooling position. The selection of push button positions is also indicated for each station so that the proper automatic machining sequence may be obtained.

Fig. 1 is a section of the set-up chart which illustrates an example of programming instructions for a turret position. Spindle speed dial is set at "274". Saddle feed dial is set at "2.57". Saddle dwell is set at "0". Rear cross-slide feed is set at "2.10". Cross-slide dwell at "0". The push button for cross-slide is set at "on". Cross-slide is set for "rear tool". Intermediate stop is "off". Continuation is "off". Back feed is "off". Cross-slide is set at "lag". Carriage relief is "off". All other buttons for this station are set at "off".

These selections mean that the cycle will start with a spindle speed of 274 RPM. The saddle will advance in fast motion to a knock-off stop. It will then go into 2.57"/-min. feed. When this tool (mounted on the face of the hex turret) reaches its end point, the saddle will return to home in fast motion (500"/min.). The rear tool slide will then advance in fast motion (250"/min.) to a knock-off stop and go into a feed of 2.10" per min. When this tooling reaches end point, the rear slide will return to home in fast motion. All tooling positions now being back home, the turret will index in approximately one second and the machine will proceed to follow instructions from the next selected turret position. And so on through the cycle.

If the J & L turret lathe insert is missing, write JONES & LAMSON, 502 Clinton St., Springfield, Vermont, for your copy.

NEW ATL AUTOMATIC TURRET LATHE



24″ saddle motion provides maximum length of turn . . . maximum rigidity

The 24" saddle motion is actuated by a closed-loop, two-level, hydraulic servo system. A variable speed, reversible DC motor is used as a velocity reference in the speed feed range. Rapid traverse of 500" per minute is obtained hydraulically.

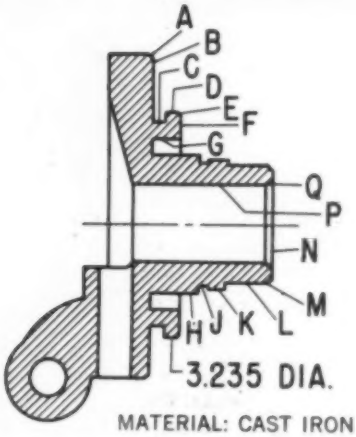
The Geneva indexing mechanism allows the turret to be indexed very rapidly (approx. 1 sec.) anywhere along the bedways. Saddle travel is not necessary to index the turret.

End point control for each tooling station of the saddle is by manually set stops on a 6-sided reel that is geared in synchronism with the hexagon turret.

HIGH HEXAGON TURRET FOR EXTRA TOOLING VERSATILITY

The high hexagon turret is designed for simplified setup of extra tooling at each turret position. Multiple tooling is accomplished by setting a second flange tool holder above the one which is in line with the spindle axis. A variety of cutter holders may then be simply set to accomplish a diversity of operations, either singly or in combination with other tooling.

The high hexagon turret eliminates the necessity of multiple turning heads and at the same time provides faster simpler and more accurate tool setting.

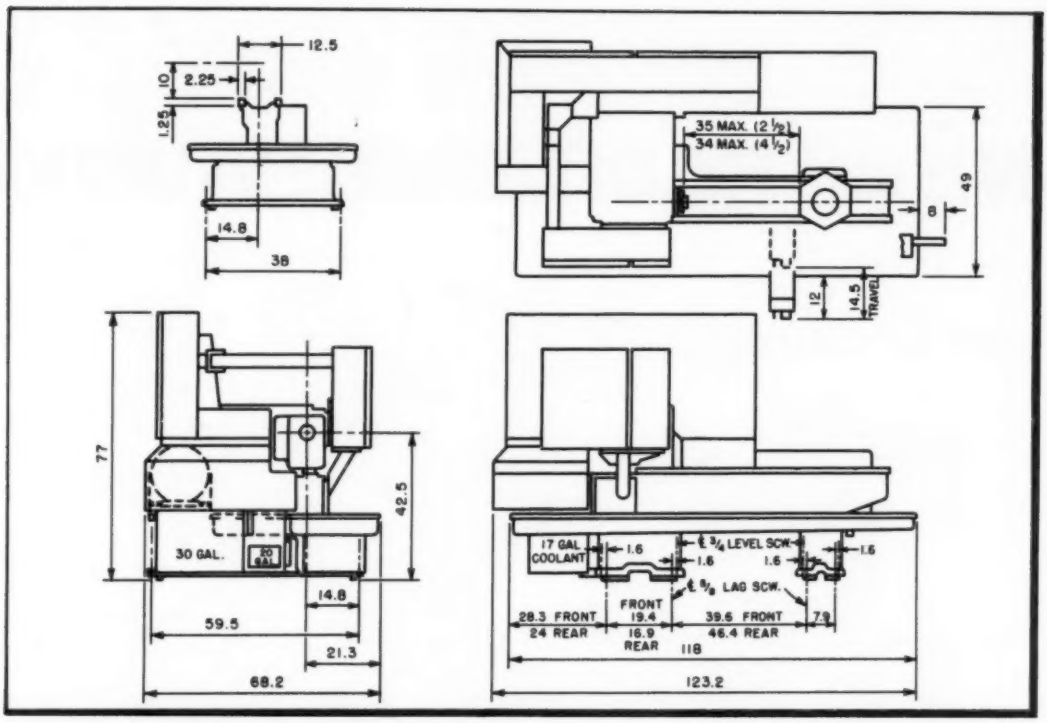


MATERIAL: CAST IRON

JONES & LAMSON AUTOMATIC TURRET LATHE

Turret Position	Cross Slide Position	Operation	Cutting Speed Ft./Min.	Feed Per Rev.
1		R. TURN K, H & D	335	.0147
	FRONT	FACE B, FACE AND NECK J, CHAMFER M	454	.0115
	REAR	GROOVE C — FACE F R. FORM, H — FACE, N	312	.0115
2		TURN, L — BORE, P CHAMFER, Q	406	.0103
3		R. CORE, H-F. CORE, G CHAMFER, E	400	.0054
4		REAM, P-CHAMFER, A	118	.585
5		F. TURN, K-F, CORE, H F. TURN, D	369	.0076
6		THREAD, L	222	.0537

2.50 MIN. FLOOR TO FLOOR — 24 PCS. PER HR. AT 100%



THE ATL OFFERS UNEQUALLED CAPACITY

	ATL 2½		ATL 4½	
COLLET CHUCK CAPACITY	**Minimum**	**Maximum**	**Minimum**	**Maximum**
Round	3/16	2½	1"	4½"
Hexagon	3/16	2⅛	1"	3⅞"
Square	3/8	1¾	1"	3⅛"
SPINDLE				
Hole in spindle	3"		5¼"	
Hole in collet tube	2⅝"		4¾"	
Spindle nose	8" type A-1		11" type B-1 American Std.	

ATL-4½" — Spindle Speeds — twelve (12) forward and reverse (24-speed headstock in same ranges available as option).

18 — 750 range: 18 - 25 - 35 - 49 - 69 - 96 - 137 - 192 - 270 - 380 - 530 - 750

24 — 1000 range: 24 - 33 - 47 - 66 - 93 - 130 - 182 - 255 - 360 - 505 - 705 - 1000

29 — 1200 range: 29 - 40 - 56 - 79 - 112 - 155 - 220 - 305 - 430 - 605 - 850 - 1200

ATL-2½" — Spindle Speeds — twelve (12) forward and reverse — (24-speed headstock available as option)

24 — 1000 range: 24 - 33 - 47 - 66 - 93 - 130 - 182 - 255 - 360 - 505 - 705 - 1000

36 — 1500 range: 36 - 50 - 70 - 99 - 139 - 195 - 275 - 380 - 540 - 760 - 1060 - 1500

40 — 2000 range: 40 - 67 - 93 - 132 - 185 - 260 - 365 - 512 - 719 - 1109 - 1419 - 2000

Swing (12" dia. Universal Chuck)

Over ways . . . . . 21¼"

Over carriage guides . . . . . 18½"

Over carriage cross slide . . . . . 13"

Carriage

Cross travel . . . . . 14½"

Rapid traverse . . . . . 250"/min.

Cross feeds, front and rear — fifteen (15) — .48 - .615 - .785 - 1.00 - 1.28 - 1.64 - 2.10 - 2.68 - 3.43 - 4.38 - 5.61 - 7.17 - 9.17 - 11.72 - 15.0 inches/minute

Hexagon Turret

Turning length . . . . . 24"

Diameter of hole in turret . . . . . 3.125"

Maximum distance from face of spindle to face of turret . . . . . 35" (2½") 34"(4½")

Feeds — fifteen (15) — .96 - 1.23 - 1.57 - 2.01 - 2.57 - 3.28 - 4.20 - 5.37 - 6.86 - 8.77 - 11.21 - 14.35 - 18.35 - 23.45 - 30.0 inches/minute

Rapid traverse . . . . . 500"/min.

Center of tool holes to top of saddle . . . 4⅞"

Bed

Width across ways . . . . . 12½"

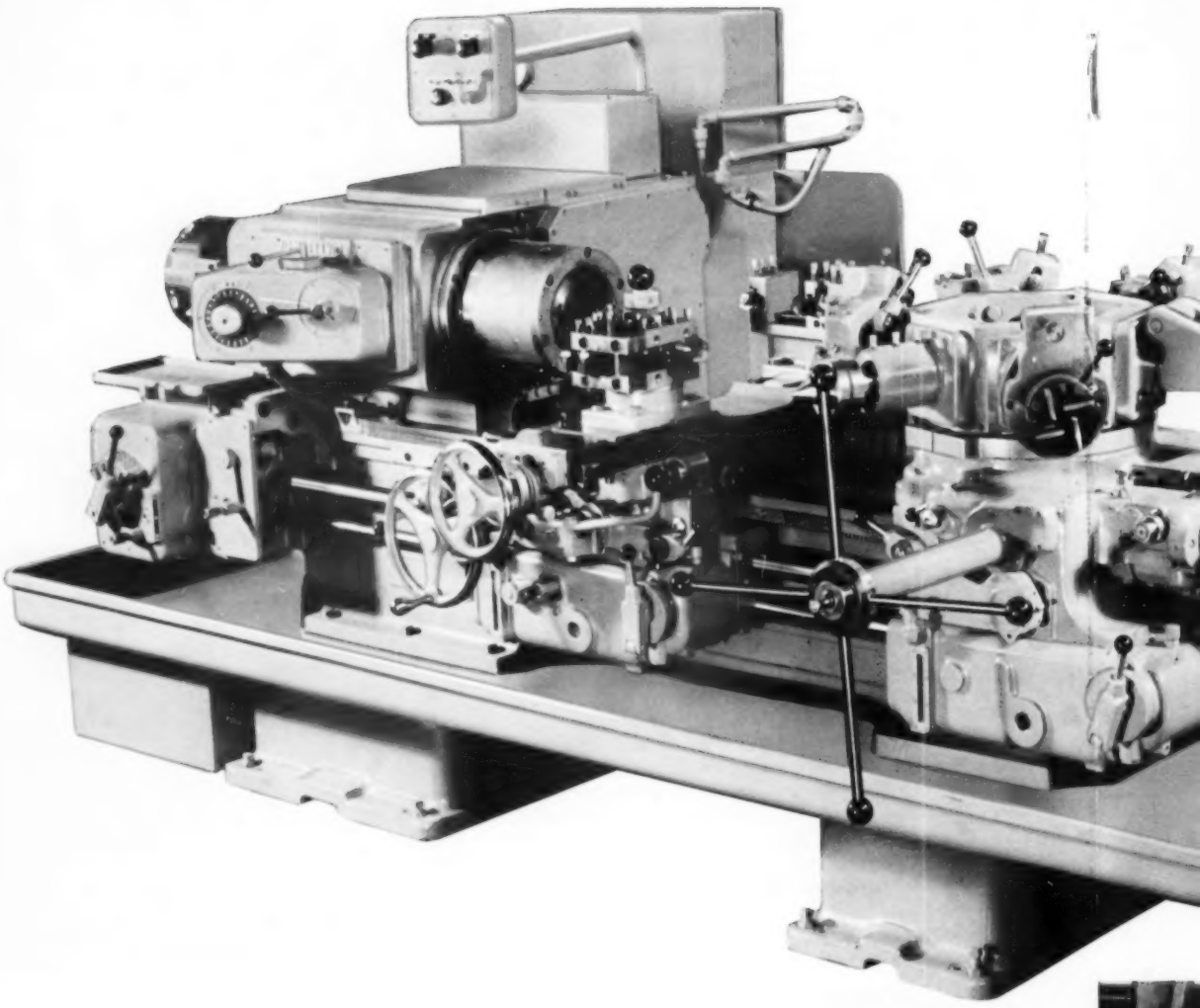
Top of ways to spindle center . . . . . 10"

Motor

40 HP maximum (1800 R.P.M.)

If the J & L turret lathe insert is missing, write JONES & LAMSON, 502 Clinton St., Springfield, Vermont, for your copy.

NEW RAM AND SADDLE TY



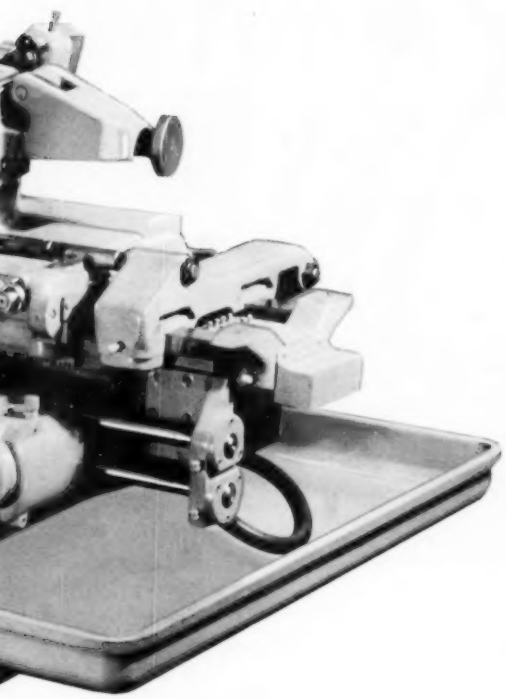
TYPE TURRET LATHES

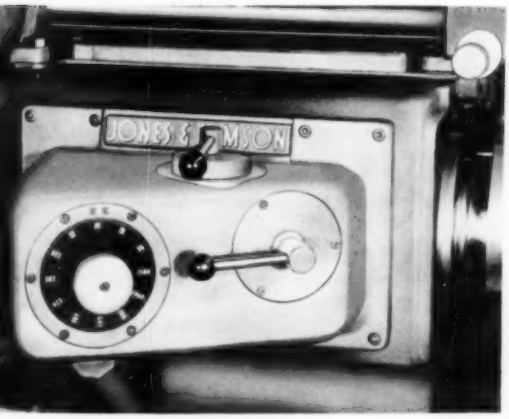
Instant Speed Changes

Hydraulic Clutches

No Gear Shifting

Single Speed Motor





These new J & L lathes are really new. No mere face lifting here. Both lathes have been completely redesigned from the floor up!

Both the Ram type and Saddle type lathes are equipped with multi-speed hydraulic headstocks and are capable of giving you more chips per tool, more pieces per hour, and more profit per job.

The new design of these machines starts with a greater leg depth for more stable footing. New cross-ribbed bed design provides even greater rigidity for heavy cuts — and gives straight-line chip disposal out the back. The new wide pan includes a built-in accessible coolant tank at the head end of the machine. The new headstock transmits up to 40 HP.

An extremely important feature is the hydraulically operated clutches, which change pre-selected spindle speeds quickly and automatically.

Other features include: motor mounted on the rear of the machine; a new carriage of rugged design, on which the stop spool is more conveniently located; heavy duty aprons which allow the adaptation of full length lead screw threading attachments (as well as the extremely versatile 2-Dimension, 180° carriage tracer); built-in independent pumps, which supply forced lubrication to the aprons, carriage, and saddle.

The new Ram type machines are available in #4, #5, #5-3½, and #5-4½ sizes. Saddle types in the new design are #7-2½, #7-3, #7-3½, and #7-4½. 12- or 24-speed headstocks are available.

These new machines offer even more power, greater accuracy and easier operation than their famous predecessors.

Spindle Speed Ranges

15-750 RPM, 20-1000 RPM, 24-1200 RPM, 30-1500 RPM, 40-2000 RPM, various speed ranges available dependent upon size of machine.

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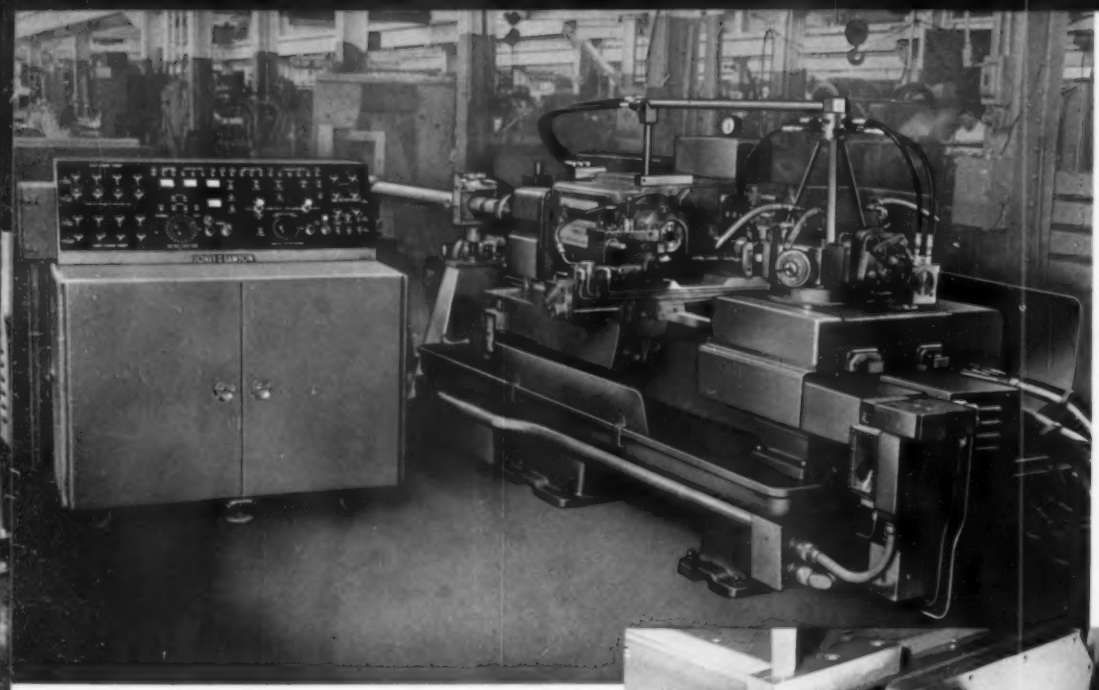
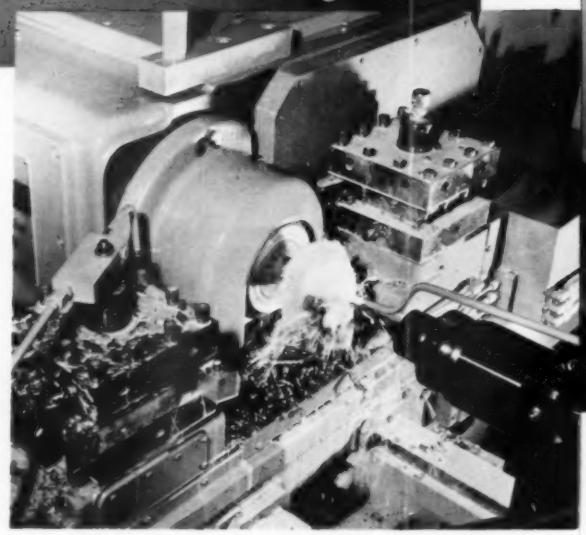




TAPE CONTROL TURRET LATHE

Shatters set-up time, lead time, and costs on short runs

After tape and tooling are prepared, the J & L NCTL can be set up and working on the first piece in approx. 15 minutes. And this would be an extreme case where tools at all 14 tooling positions would have to be changed. Now, consider more realistic operations (such as a series of shafts or gear blanks or other similar parts). This is where the probabilities favor the changing of only one or two tools at an average of approx. one min. per tool. And at this point the economic benefits of tape control turret lathe operation become startling indeed.

This turret lathe (built in two sizes, 21" or 30" swing) makes parts automatically using pre-set tools according to instructions provided by standard 1" wide 8-channel punched tapes. It can be set up for either bar work or chucking work.

The carriage, cross-slide and saddle all have motion at any of 16 feed rates or in fast motion. Each slide moves to location within + or −.001" and repeats within + or −.0005". Therefore, repetitive tolerances + or −.0005" on location and on diameter can be expected, after the first piece has been made and adjustments dialed to compensate for tool spring or setting.

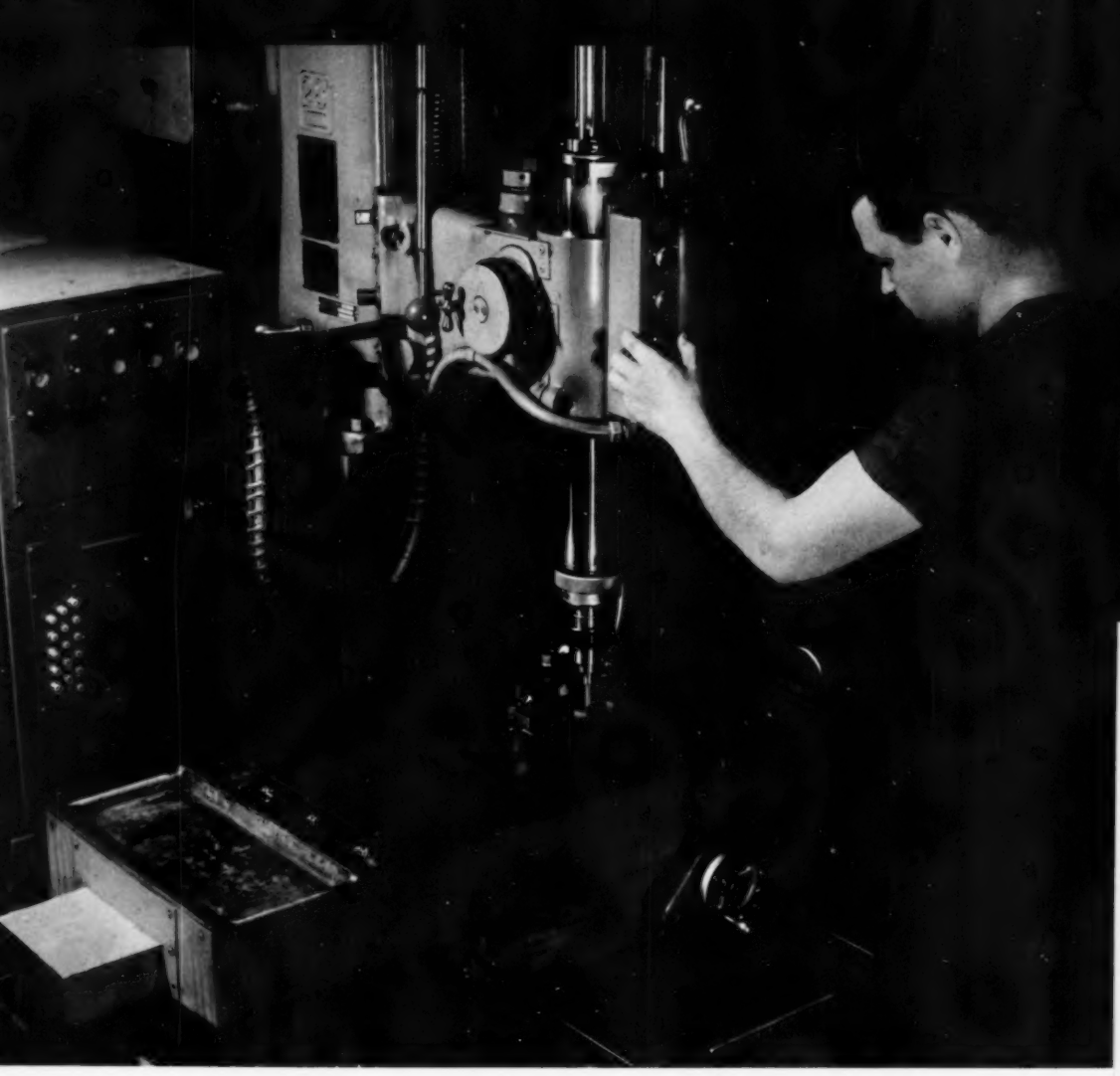
The control system provides tape control for carriage, cross-slide and saddle movements; speed and feed changes; hexagon turret indexing, front and rear square turret indexing; coolant, bar feed, collet chuck; opening and closing die heads and roller turners and accessory tools mounted on the hexagon turret.

Corrections for 22 end-point locations of the tool-carrying members, without need for repunching the tape are provided on the console with up to + or − .015" adjustment. The system is capable of operating two motions simultaneously.

Standard Tape and Code

This numerical control uses a word-address code system. The 1", 8-channel, tape is prepared with an EDP typewriter, such as the Friden Flexowriter. A simple language is used for coding. Alphabetical abbreviations provide functional designations, while numerical information is used to specify speeds, feeds and distance, or end-point, measurements.

Distances are in actual decimal dimensions while speed and feed numbers refer to steps in the feed-speed selection range. For example, from the 24 forward (12 reverse) available speeds, the speed setting code 16 would mean 512 RPM. Speed ranges may vary from a low of 20 to 1000 RPM to a high of 40 to 2000 RPM.



TAPE CONTROL POSITIONING IS HERE TO STAY

Tape control positioning tables have unquestionably proved their capabilities. They reduce production lead time, eliminate jigs, minimize tool changes and wear, reduce set-up time, increase positioning accuracy, shorten cycle time, reduce operator fatigue and required skill, and insure repetitive accuracy.

The competitive advantages of J & L Tape Controlled Positioning Tables assure potential users of getting all the above capabilities to the highest degree.

Here's why:

1. The J & L Positioning Table is a solid machine tool, accurately designed and ruggedly constructed.
2. Its design allows for the adaptation of a variety of different types of electronic control units. The user may choose units for purposes of standardization, service, or other reasons.
3. J & L Positioning Tables may be applied to a variety of makes of radial and post drills, including those with automatic cycling and turret indexing.
4. Fast, positive, accurate point-to-point positioning is assured with the J & L Positioning Table. Its closed loop, two-stage hydraulic servo system provides an average travel rate of 190″ per minute, including decelerating and stopping at the desired position.
5. Repeatability of the J & L Positioning Table is ±.0005″ no matter who's operating it.
6. J & L Positioning Tables have been in operation in the field for over three years. Performance record? Satisfied users answer that question with comments like these: "Saved $4,000 in first 6 weeks of production thru cancelled orders for jig drills."; "Eliminated storage and maintenance of $29,000 worth of jigs."; "Saved an average of 30% to 40% in floor-to-floor time on every job put on a J & L Positioning Table over a full year of operation."

So performance is a matter of record.

Table Travel: 12″ x 20″, 20″ x 20″.

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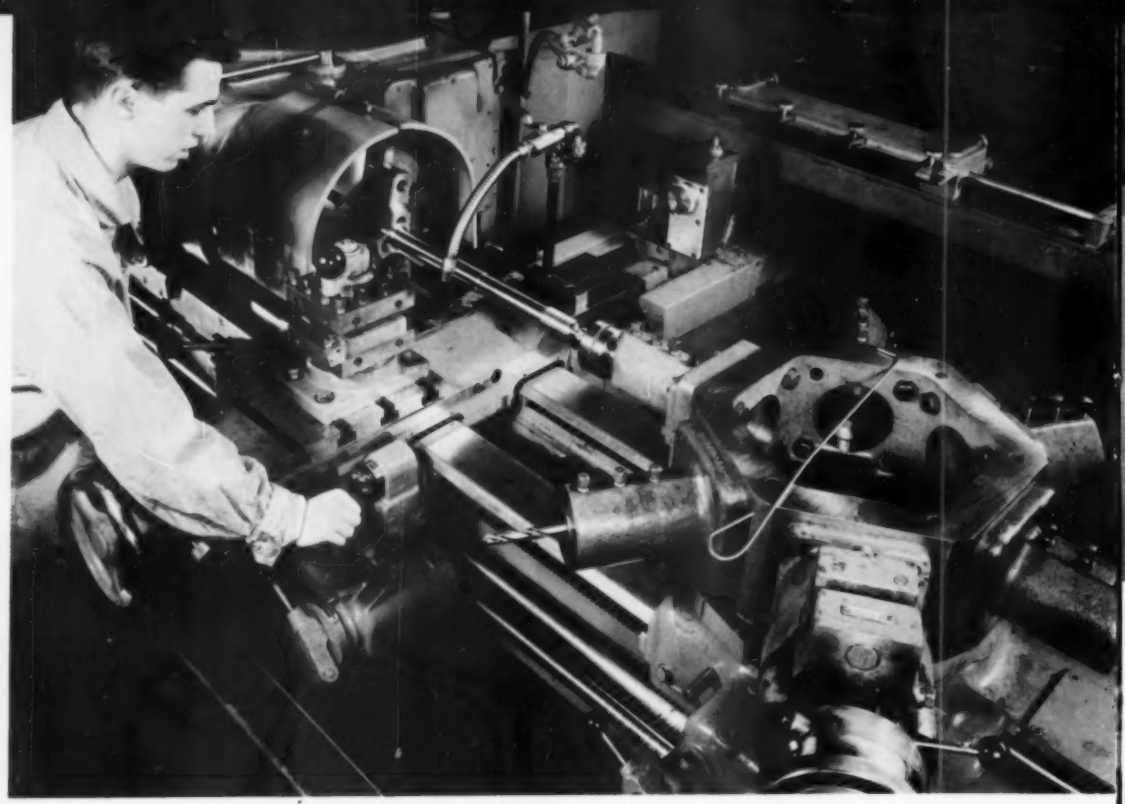


180° TURRET LATHE TRACING

Here's the versatile combination that gets the most out of one chucking . . . minimizes handling time . . . increases accuracy.

The J & L hydraulically powered Two-Dimensional Tracer mounts on the rear of the cross-slide carriage of J & L Turret Lathes to provide *complete* machining to tight tolerances. A single stylus and flat template control the cross-slide table travel and longitudinal carriage travel. A single feed selector controls feed in all directions.

Normal turret lathe operations can be used, either in conjunction with tracing, or separately. For example, operator can rough out, trace thru more than 180° of contour while turning, and 180° while facing. ***And complete control for diameter is accomplished with the conventional graduated handwheel, for either tracing or mechanical operation.***

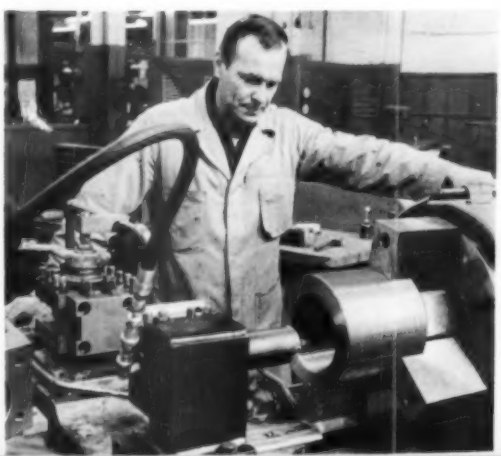
Tracer turning capacity is the same as mechanical capacity of lathe in 20″ increments. Facing capacity is up to 6″ radius change. Feed range is ½″ to 18″ per minute. Cross-slide has hydraulically operated rapid traverse apron and heavy-duty diameter feed screw. 45° and 60° tracing units are also available.

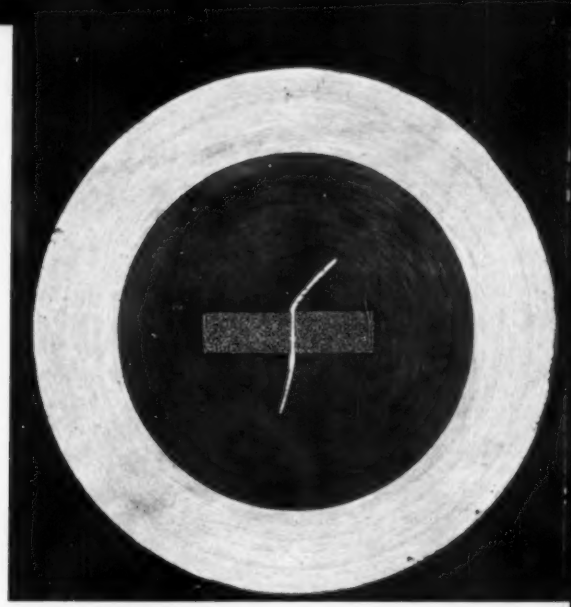
Single Point Threading to a Finish of 15-20 RMS IS COMPLETELY – *AUTOMATIC*

That's right! With the J & L AUTO THREADER straight, taper, and combination threads can be *automatically* chased, internally and externally, to high precision finish.

Mounted on the cross-slide, the AUTO THREADER utilizes the full capacity, rigidity, accuracy, and PRODUCTIVITY of standard J & L Turret Lathes. Precision lead control is maintained by positive engagement of a split-nut follower to the full depth of a hardened-and-ground leader. Uniform thread length is assured by positive stop and follower nut disengagement, together with rapid tool withdrawal. Standard pitches are readily obtained thru interchangeable leaders and followers.

AUTO THREADER utilizes the swing, bar capacity, distance between centers, spindle speeds and motor ratings of the complete line of J & L Universal Ram and Saddle Type Turret Lathes. Max. threading length: 7″ on Standard Turret Lathes, and 11″ on No. 10 Turret Lathes. Threads per inch: 2-64; Max. passes per cycle: 16; Max. tapers: 3½″ per ft. (12″ long standard); 4¾″ per ft. (8″ long optional); Max. number of starts: 4.





LIGHT CONCENTRATORS WITH J & L OPTICAL COMPARATORS OPEN NEW FIELDS IN MINIATURE ASSEMBLY INSPECTION

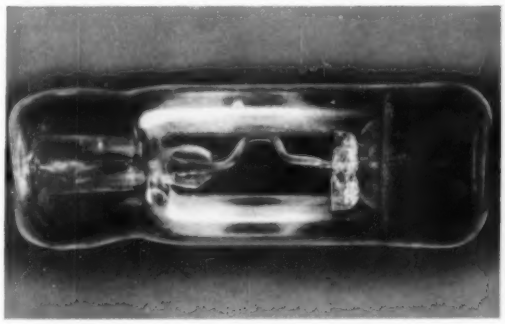
Simply slip on a CENTRALITE or PARABOLITE adapter, and your J & L TC or FC-14 Optical Comparator can take on seemingly impossible inspection jobs!

For example, CENTRALITE (upper left) makes possible the highly accurate image (upper right) of a tiny recording head used in a computer component. Light is concentrated intensely on the head and reflected back through the J & L projection system onto the viewing screen of the Comparator at 31.25 magnifications. Note that the two magnetic poles, separated by a magnetic insulator (white streak) and imbedded in plastic, are clearly visible for inspection.

Tunnel and Mesa Diode Inspection

In illustration at right, PARABOLITE permits detailed inspection of a tiny tunnel diode assembly. PARABOLITE surrounds the diode with concentrated light to provide an extremely sharp image at 31.25 magnifications. By simply rotating the diode, inspector can take a close look at seal, bubble configuration at fusion points, joining of the lead wire to the bead, gold contact to wafer, surface condition of wafer, and other vital details.

Two simple ways to *tailor* light to your inspection applications.



This reproduction of the reflected image of the diode at 31.25 magnifications has been reduced for printing purposes. Nevertheless, components are clearly defined.

■ *Send leasing information . . . plus . . . catalogs containing complete details on:*

- ☐ Ram Type Universal Turret Lathes
- ☐ Saddle Type Universal Turret Lathes
- ☐ Hydraulic Tracing Attachment
- ☐ Auto Threader
- ☐ Automatic Turret Lathes
- ☐ Numerical Tape Control Turret Lathes
- ☐ Numerical Tape Control Positioning Table
- ☐ "Avoidable Costs" Replacement Formula
- ☐ Optical Comparators

NAME.....

TITLE.....

COMPANY.....

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CITY.....ZONE.....STATE.....

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TURRET LATHES

AUTOMATIC • STANDARD • TAPE CONTROL
all from

JONES & LAMSON MACHINE COMPANY

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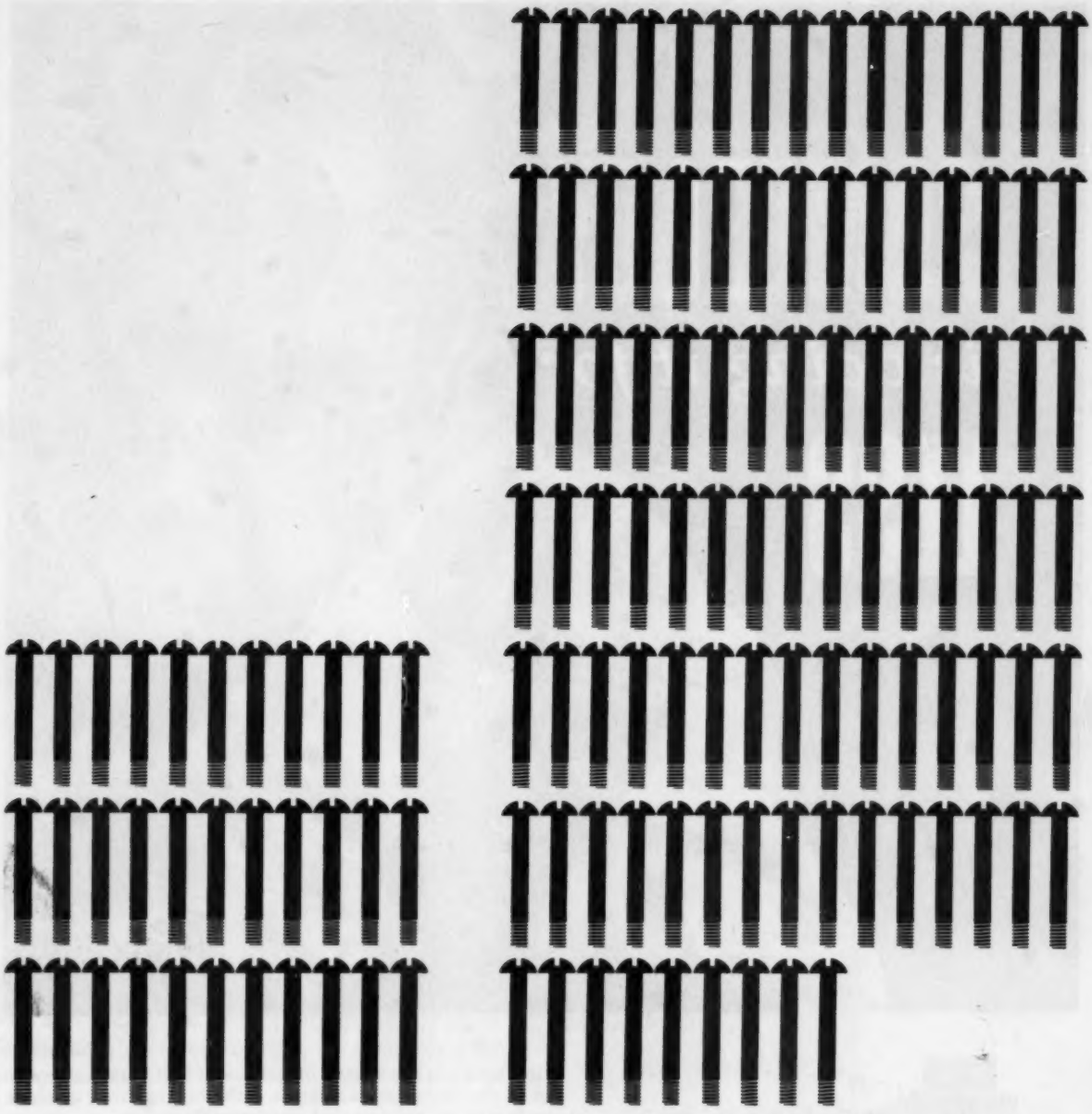

33
parts per pound
from
most metals

99
parts per pound
from Olin cold processed
aluminum rod and bar

Olin Aluminum's *cold processed* rod and screw machine stock gives you up to three times as many parts per pound as ferrous metals or brass. Olin's *cold processed* method produces rapid cutting aluminum stock with finer grain for better machining characteristics. Fewer secondary operations are necessary in many cases, and the blemish-free metal results in better finishes. A full range of color-coded alloys, in rounds and hexagons, in a wide range of sizes, are immediately available from the stocks of your nearby Olin Aluminum Distributor.

All Olin Aluminum advisory services are available without charge to manufacturers who want to convert machining operations to aluminum, who are developing a new aluminum product, or who have questions about selection or application of any Olin Aluminum alloy.

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ALUMINUM®
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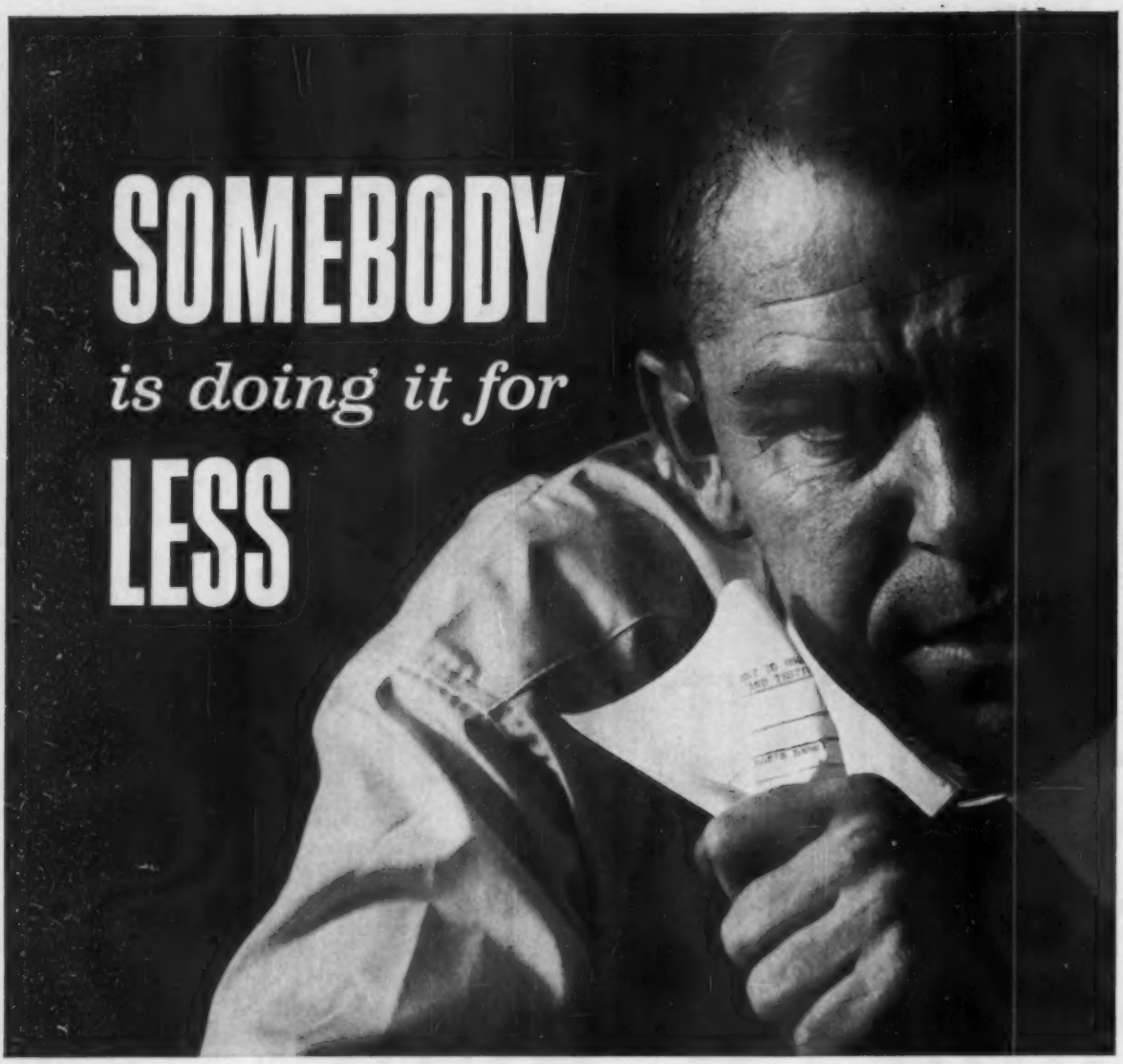

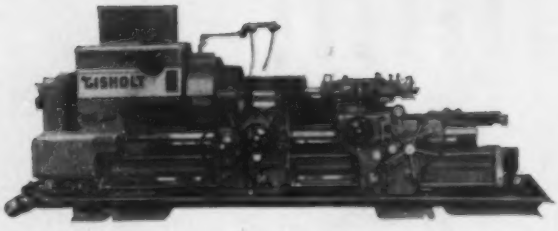

MASTERLINE® 3L Saddle Type Turret Lathe—This lathe offers maximum operator ease through an electric clutch and brake; speed selector for Direct, Pre-Set or Hi-Lo among 12 or 24 spindle speeds, with ample power available at every speed; separate lever controls for cross and longitudinal rapid traverse; and fully automatic lubrication. With a cross-feeding hex turret, low-cost standard tools handle all types of machining. JETracer® (for cross slide, cross-feeding hex turret, or mounted on turret face) and other attachments minimize operator skill—handle tapers, contours, steps and combination forms automatically.

How long could you stay in business if half your employees spent over three hours a day on coffee breaks? Your machine tools may be wasting that much time!

Farfetched? A new machine is at least 40% more efficient than its 10-year-old counterpart. You can replace ten old hand-operated lathes with only six current models.

Your savings would pyramid with reduced machining times, reject rates, floor space, maintenance costs, tooling, lubricants, power, and skilled labor requirements.

Act now! Call your Gisholt Representative. Find out how Gisholt MASTERLINE Machines can help you do it for less.

Write for Literature.

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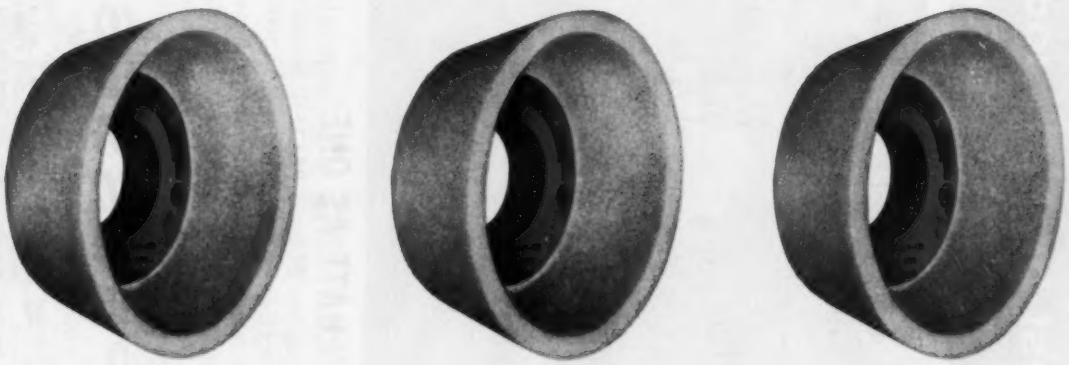
POSITIVE DUPLICATION—EVERY TIME!



Music to please you is identically reproduced by these three hi-fi records pressed from the same master recording. The three toolroom grinding wheels (above) will also please you with their masterly Positive Duplication. That's because they are CINCINNATI (PD)* GRINDING WHEELS.

FAMOUS, UNIQUE (PD) PROCESS

Unique in the industry, the famous Cincinnati (PD) manufacturing process is governed by 36 unvarying quality control steps. Print-weigh tickets, for example, must match the weights for every mix—*exactly* as specified on the Master Card which controls every operation in the rigid procedure.

UNIFORM, PREDICTABLE PERFORMANCE

This extraordinary attention to manufacturing detail results in wheels of unsurpassed uniformity.

You can reorder CINCINNATI WHEELS with confidence, because they give you the same good job time after time after time. You use fewer (PD) wheels because they last longer.

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Factory trained by the Cincinnati Milling Machine Company, our grinding specialists are available to you for consultation on all your grinding problems. Call your CINCINNATI GRINDING WHEELS Distributor, or contact us direct, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

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GRINDING WHEELS

*Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

15 years engineering and millions of dollars invested* to perfect the world's finest brake...today's PACIFIC HYDRAULIC PRESS BRAKE

Over 9 out of every 10 hydraulic press brakes in operation today are PACIFIC providing...

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- Freedom of maintenance and leakage
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- More accuracy in level control
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- More operating convenience
- Greater visability
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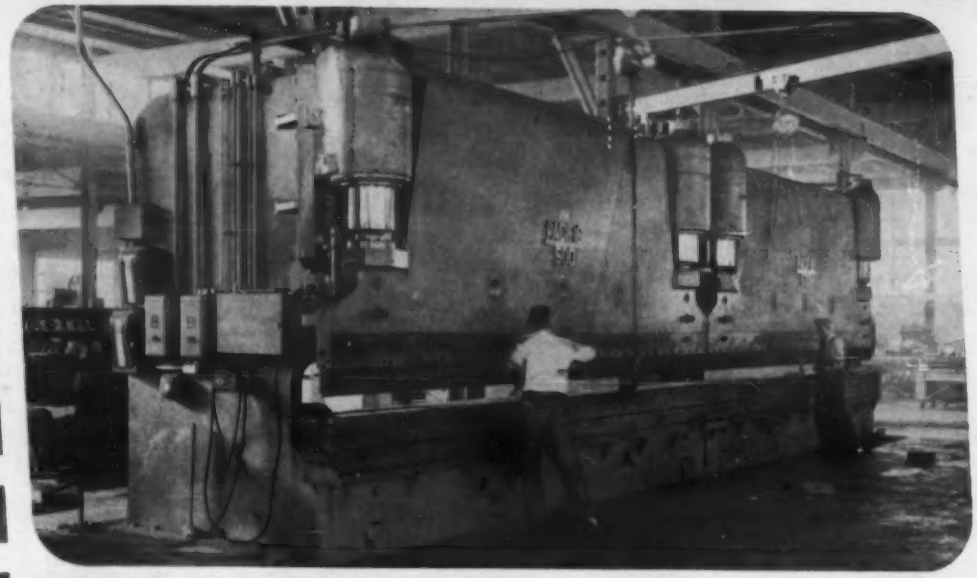
- Shock-free hydraulic system suitable for punching



TWO 20 FT. BRAKES OPERATE AS ONE to punch and form 40 ft. checker plate in single hit. By purchasing two 500 ton PACIFIC brakes which can operate together as a single 1000 ton brake 40 feet long or as two independent 500 ton machines, each 20 ft. in length, this custom fabricator found the practical means to form tremendously long pieces without an additional investment of tens of thousands of dollars for a single 40 ft. long 1000 ton machine. The company also gets the benefit of double production in forming shorter sections.

*THIS INVESTMENT ENABLED PACIFIC TO INTRODUCE:

- Tape control to synchronize cylinders within .003" (1947)
- Cushioned punching (1949)
- Precision depth control to repeat accuracy within .001" (1951)
- Manual turret stroke controls for progressive bending (1952)
- Selective anti-whip speeds to eliminate reverse bends (1952)
- Tandem operation of press brakes for forming pieces 40 ft. or longer (1953)
- Tonnage control to protect light dies in heavy press (1953)
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- Cylinder ram guides for increased rigidity (1956)
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- Shockless hydraulic valving to eliminate cause of leakage (1959)

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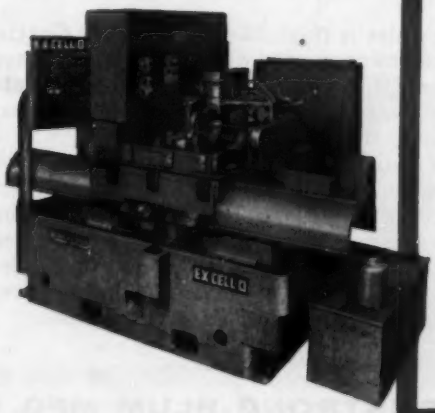
Ex-Cell-O, builder of the "world's most accurate production machine tool," is staffed and equipped to put into parts for your products the same degree of machining skill, modern heat treat methods, and advanced assembly and inspection techniques that go into our own precision products.

Whatever your requirements in the size, material or quantity of prototype or production parts and assemblies, your job will receive the extra attention to detail and scheduling which many of our customers have relied on for more than 40 years.

Contact your local Ex-Cell-O Representative for details, or send your prints or specifications to Ex-Cell-O. Your inquiry or request for quotations will receive prompt attention.



Precision parts and assemblies, ground worms

Miscellaneous production parts, drill jig bushings

Machined forgings, hardened and ground railroad details

Tape-controlled Numera-Trol Precision Contouring Machine is controllable to .000025", has templet scribing-grinding head and interchangeable turning-boring head.

60-49

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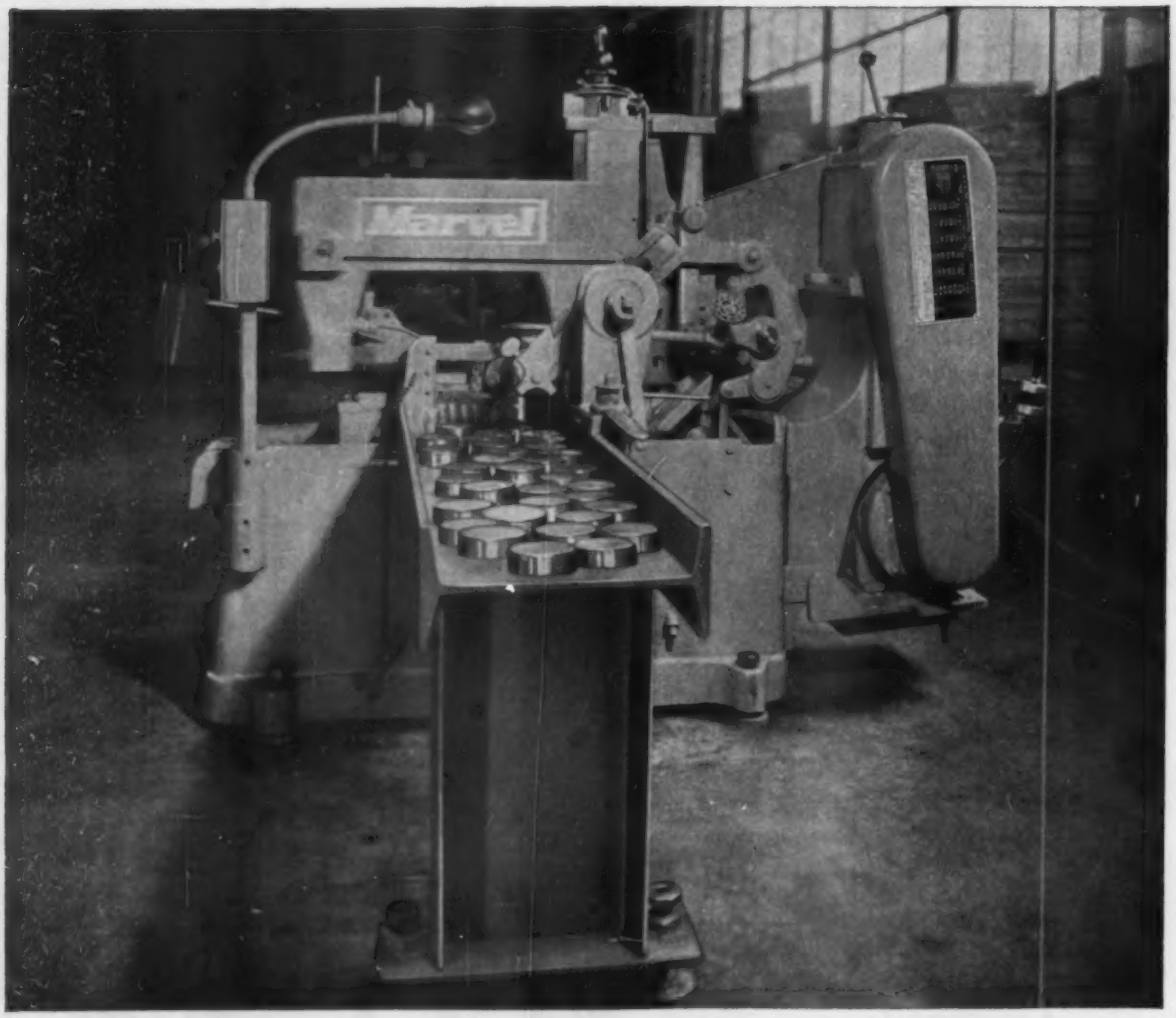
Machinery Division

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN



Payoff End of a Production Marvel

A cut-off saw's value is proven at the discharge end of the machine. How quickly the trough is filled with accurately cut-off pieces can mean the difference between profit and loss on many jobs.

The R. J. Sudrick Co., Des Plaines, Illinois, manufacturers of precision aircraft components had to cut-off 4600 blanks from 3¼" round, 303 Stainless Steel Bars.

They bought our MARVEL No. 6A4 High Speed Heavy Duty Automatic Bar Feed Hack Saw Machine; used MARVEL High-Speed-Edge Hack Saw Blades, and got the high production, accuracy and economy they desired.

PRODUCTION? Constant at 20 pieces per hour floor to floor

ACCURACY? Held well within the permissible tolerance of +.010 —.000

BLADE COST? Just 1½¢ per cut. Only twenty-three MARVEL blades were needed to make the 4600 cuts, and not a single blade failure due to blade breakage. MARVEL High-Speed-Edge Blades are unbreakable.

The point is this: MARVEL Metal Cutting Hack Saws equipped with MARVEL High-Speed-Edge Hack Saw Blades are an unbeatable combination for economical, accurate and safe cutting-off.

If your hack saws are not producing the economy you need to meet today's competition, try MARVEL High-Speed-Edge Blades. They will give you the competitive edge every time. Write for Catalog C-85 which has the complete story on MARVEL Hack Saws and Band Saws, Hack Saw Blades and Band Saw Blades.

ARMSTRONG-BLUM MFG. CO.

5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

MARVEL Metal Cutting SAWS

Better Machines-Better Blades

DO YOUR OPERATIONS DEMAND ACCURATE CENTERS?

Ex-Cell-O Center Lapping Machines Increase Accuracy, Reduce Scrap!

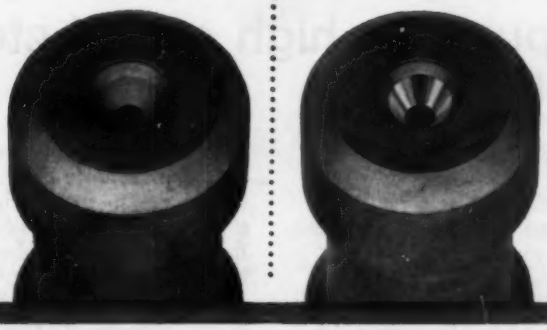
Precision Center Lapping Machines remove heat-treat scale, and eliminate roughness and distortion of centers to insure accuracy in subsequent operations.

Easy to use and modestly priced, Center Lapping Machines include as standard, inbuilt equipment Ex-Cell-O Precision Spindle and manual diamond dresser.

See your Ex-Cell-O Representative, or write for Bulletin 40271.

BEFORE LAPPING

- Out of line
- Out of round
- Incorrect angle
- Rough or torn



AFTER LAPPING

- Perfect alignment
- True roundness
- Precise angle
- Mirror-smooth

60-37

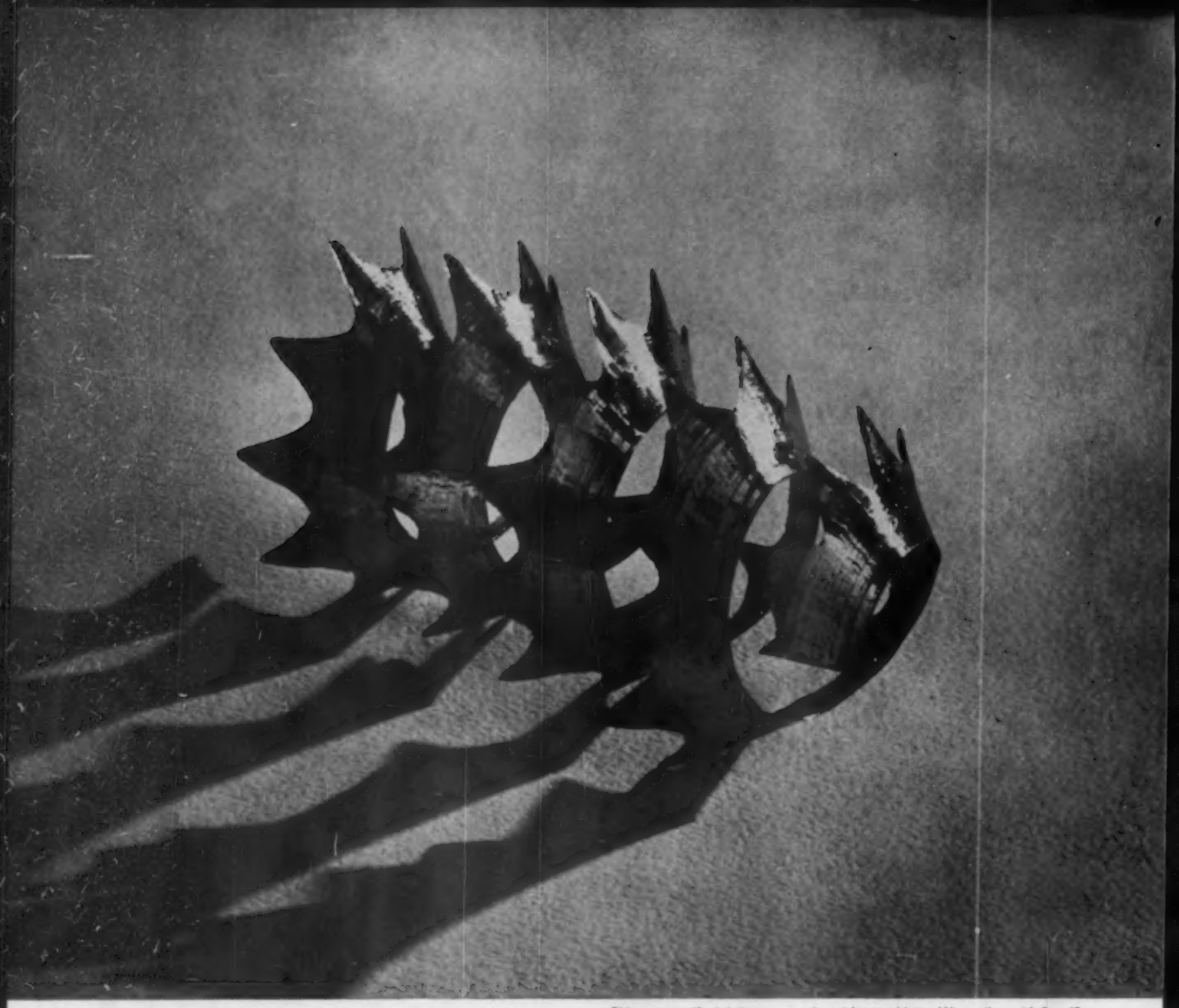
EX-CELL-O FOR PRECISION

PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • JIG AND FIXTURE COMPONENTS • TORQUE ACTUATORS • CONTOUR PROJECTORS GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • COMPUTER PRODUCTS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • DAIRY AND OTHER PACKAGING EQUIPMENT

Machinery Division

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN



Chip – magnified 4 times – produced by machining Waspalloy with Rex 49

New Rex 49 outlasts other special purpose high speed steels better than 2 to 1

Rex 49 – a new high speed steel that can machine today's "difficult-to-cut" metals *faster and more economically* than existing special purpose high speed steels – is another in the long line of advances and improvements in specialty steels to come from Crucible research.

Crucible laboratory tests indicate that tools made of Rex 49 last as much as 4 times longer than other special purpose high speed steels . . . and it has a base price ⅓ to ½ of these steels.

Both laboratory and field reports prove the advantages of Rex 49 for machining hard, tough or abrasive metals, such as heat-treated alloy steels, stainless, titanium, and superalloys. These tests also indicate that Rex 49 has advantages in machining the more conventional metals through increased speeds, feeds and depths of cut — and Rex 49 can be hardened with conventional high speed steel heat treating equipment.

Rex 49 is indicative of Crucible's continuing leadership in the development of improved high speed and tool steels.

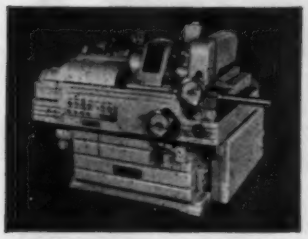
For more information, write: *Crucible Steel Company of America, Dept. HD01, Four Gateway Center, P. O. Box 88, Pittsburgh 30, Pa.*

CRUCIBLE | STEEL COMPANY OF AMERICA

CIRCLE 201 READER SERVICE CARD

THREAD GRINDING COSTS TOO HIGH?

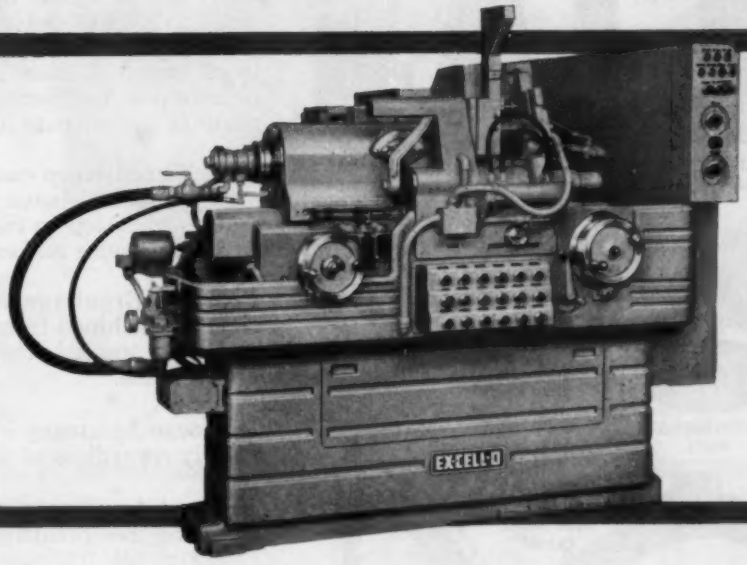
Here's How a Modern Ex-Cell-O can Increase Production and Lower Your Labor Costs



1939—Style 39 Ex-Cell-O Internal Thread Grinder, then the fastest of its kind, produced 17 automotive steering gear ball races per hour. It had power wheel dresser, automatic dresser compensation and automatic wheel feed.

1946—The part's the same, but the manufacturer has turned to a postwar Ex-Cell-O Style 39-A Precision Thread Grinder with fully automatic grinding cycle, including automatic wheel dressing at predetermined intervals. Operator simply loaded the part, reset the size handwheel and pressed the start button. Production increased to 24 parts per hour.

1960—Modern Style 39-A, today produces the same basic part but now at a rate of nearly 60 parts per hour. This powerful, versatile machine has a high-speed workhead, high-frequency Bryant Grinding Spindle, automatic loading, unloading and cycling. It requires only the part-time attention of one unskilled operator.



TOMORROW—Will you have a similar long-run part, or perhaps pinions, worms, taps, thread gages, lead screws, missile components or other special parts that cannot be rough- or finish-ground economically on your present equipment?

Your local Ex-Cell-O Representative can show you how modern Ex-Cell-O Precision Thread Grinders can substantially reduce the cost of producing a wide variety of your large and small threaded parts. Call him today, or write direct for details on the complete line of Ex-Cell-O Internal, External and Universal Thread Grinders for every toolroom and production job.

60-35

EX-CELL-O FOR PRECISION

PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • JIG AND FIXTURE COMPONENTS • TORQUE ACTUATORS • CONTOUR PROJECTORS GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • COMPUTER PRODUCTS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • DAIRY AND OTHER PACKAGING EQUIPMENT

Machinery Division

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

ARMSTRONG

SET-UP *and* HOLD-DOWN TOOLS

ARMSTRONG PLANER JACK — ARMSTRONG BRACING JACK — ARMSTRONG VERTICAL JACK — ARMSTRONG ADJUSTABLE STEP BLOCK

ARMSTRONG "T" SLOT BOLT — ARMSTRONG "T" SLOT NUTS

ARMSTRONG NUTS — ARMSTRONG WASHERS

ARMSTRONG UNIVERSAL ADJUSTABLE CLAMP

ARMSTRONG SET-UP WEDGES — ARMSTRONG "T" SLOT CLAMP

ARMSTRONG PLAIN CLAMP — ARMSTRONG SCREW HEEL CLAMP — ARMSTRONG GOOSE NECK CLAMP

ARMSTRONG DOUBLE FINGER CLAMP — ARMSTRONG FINGER CLAMP — ARMSTRONG "U" CLAMP

Whatever its shape, a work piece can be quickly, easily and safely set up on any T-slotted table with ARMSTRONG Set-up Tools. Comprising a complete "system" of supporting and holding devices in all essential sizes, ARMSTRONG Set-up Tools usually pay for themselves on the first job and continue to lower costs for years to come.

Save Time: Keep costly machines and high priced men producing—save time otherwise lost while operators rummage in the scrap box for materials with which to devise makeshift set-up methods.

Prevent Breakage and Spoilage—correctly designed, machined from special steels or drop forged and heat treated, they are extremely stiff, strong and reliable.

Increase Accuracy—hold work rigidly and support it fully regardless of shape.

Prevent Accidents—end risk of set-up failure with resulting tool breakage, damage or personal injury.

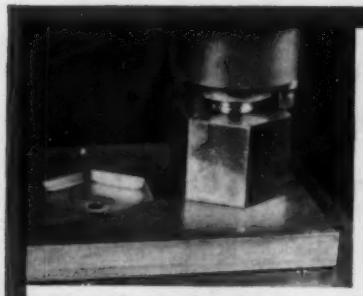
Increase Profits—by reducing down time, increasing man hour output, assuring accuracy, ARMSTRONG Set-up and Hold-down Tools cut costs and build profits. They are part of every properly equipped tool room and shop.

Your Local Armstrong Industrial Distributor carries a good stock of Set-up and Hold-down Tools. He offers you quick, efficient service on these, as well as other, quality ARMSTRONG Tools.

See us at Booth No. 3906
ASTME SHOW, New York Coliseum

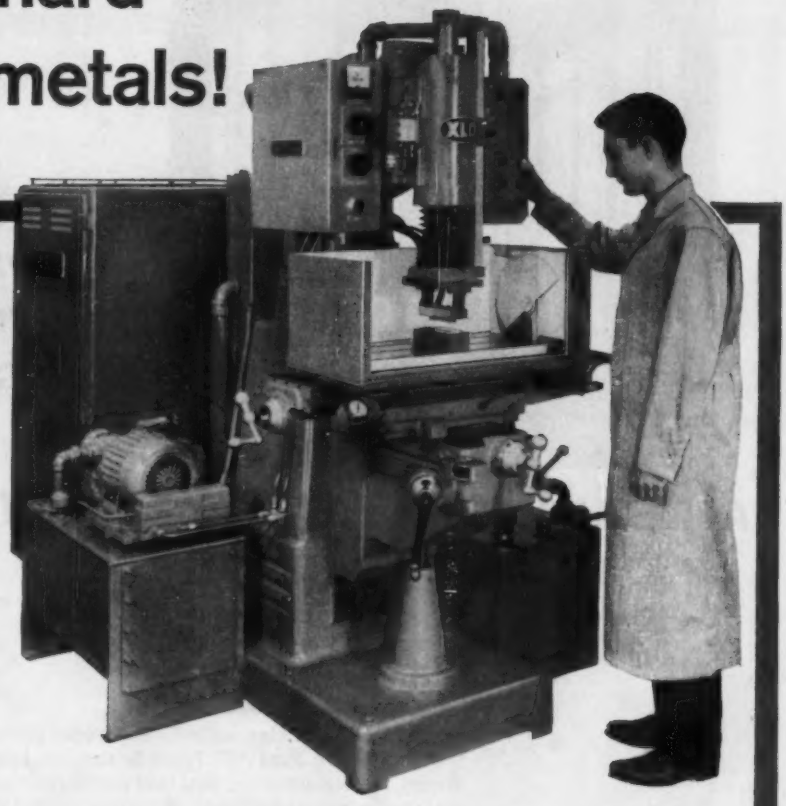
ARMSTRONG BROS. TOOL CO.
5215 W. ARMSTRONG AVE. • CHICAGO 46, ILL.

LECTRA-FORM...The easy, low-cost way to cut hard and tough metals!



Lectra-Form produces an accurate, inverse image of the tool with a fine, uniform matte-type finish.

This wrench die was machined by Model 244 shown at right. Removable front panel of dielectric tank simplifies loading.



If the material you're working conducts electricity . . . you can drill, pierce, trepan, slot or cut it, or sink intricate die cavities in it with LECTRA-FORM, the all-new Ex-Cell-O Vertical Electrospark Machine!

Using low-cost, conductive sheetmetal, rods or tubing for tooling, LECTRA-FORM produces an inverse image of the tool, or electrode, through high-current, low-voltage electrical spark discharge. There is no tool pressure, no heat.

Standard Model 244 features include four-way slide positioning and vertical knee movement, automatic tool feed and gap distance control, front-load work tank, plus graduated dials for work positioning, a power supply cabinet and dielectric fluid storage tank.

Contact your Ex-Cell-O Representative, or write direct for complete details.

60-79

EX-CELL-O FOR PRECISION

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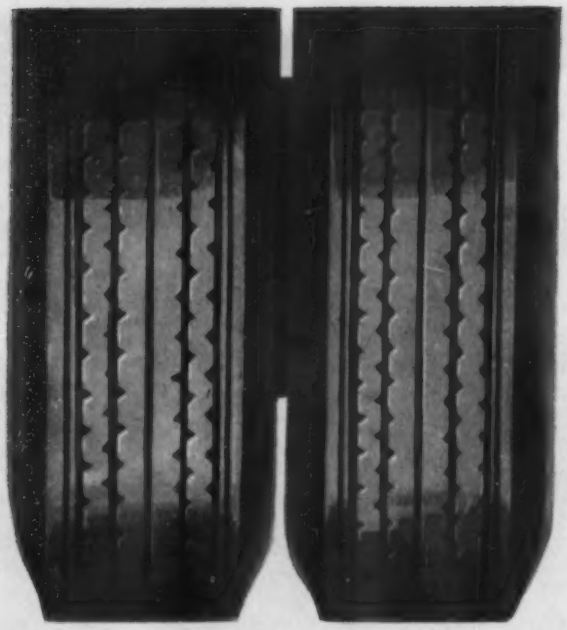
Machinery Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN



UP PROFITS BY ENDING WEIGHT ERRORS!

FAIRBANKS-MORSE TYPE "S" TRUCK SCALES

Good weighing builds good will—and bigger profits.

Our exclusive Type "S" Truck Scales are famous for accuracy, low maintenance, best load distribution, and minimum installation requirements. They provide greater protection to pivots and bearings under massive loads and sudden stops.

Each Fairbanks-Morse Type "S" Truck Scale is extremely accurate. High-tensile-cast, one piece levers prevent warping, failure, corrosion due to damp scale pits. Exclusive Type "S" design provides super strength, better weight transmission, and protection for sharp knife edges. All parts, including pivots and bearings, are completely interchangeable.

Each Fairbanks-Morse Type "S" Truck Scale is expandable —for longer trucks and larger payloads.

You have a choice of indicators, either Beam type—or our exclusive, swiveling "Floaxial" Dial for fully automatic read-outs!

F-M Type "S" Truck Scales range in capacities from 10 to 100 tons and higher. Platform sizes from 18' x 9' up to any size required for the weighing of vehicles according to legal limits. Optional accessories include: double face dial; Printomatic for accurate, trouble-free weight recording; and type-registering weighbeam, etc.

For further information, write: **C. G. Gehringer; Scale Division; Fairbanks, Morse & Co.; 19-01 Route 208; Fair Lawn, New Jersey.**

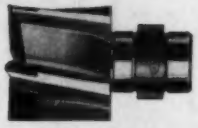
FAIRBANKS MORSE

A MAJOR INDUSTRIAL COMPONENT OF

FAIRBANKS WHITNEY

6 Features that make a big difference in counterboring operations!

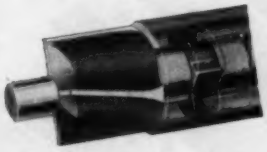
1. HAND DETACHABLE . . . a twist of the wrist engages or releases the cutter after the severest cutting operation.



4. BALANCED DRIVE . . . double bearings—one on each side of drive lug—provide extra rigidity.

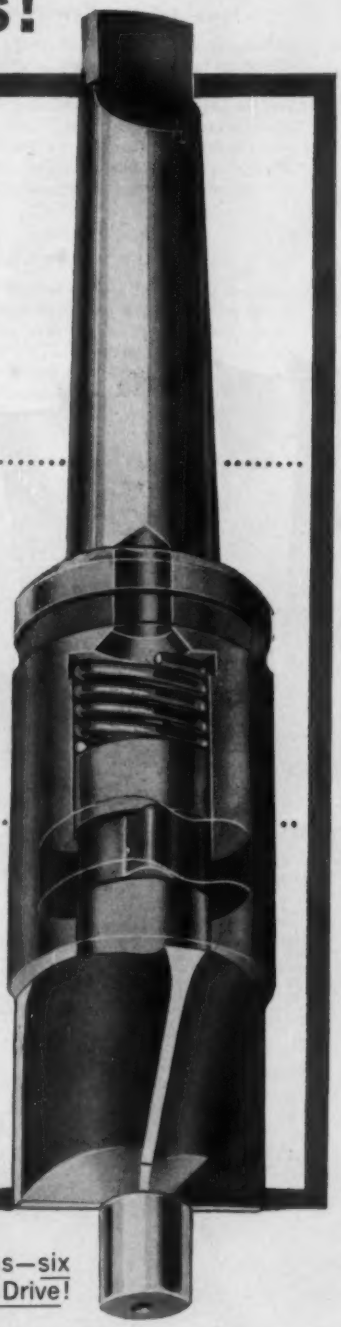
2. STURDY DRIVE . . . diametrically opposed drive lugs engage corresponding abutments in the holder.

5. FREE FROM OBSTRUCTIONS . . . holder body slips easily into a bushing or can be threaded for stop nuts or collars or fluted for lubrication.



3. EXTRA TORSIONAL RIGIDITY . . . drive lugs are close to seating shoulder of cutter for powerful, smooth operation.

6. PRACTICALLY INDESTRUCTIBLE . . . no binding, no shearing—driving forces apply compression.



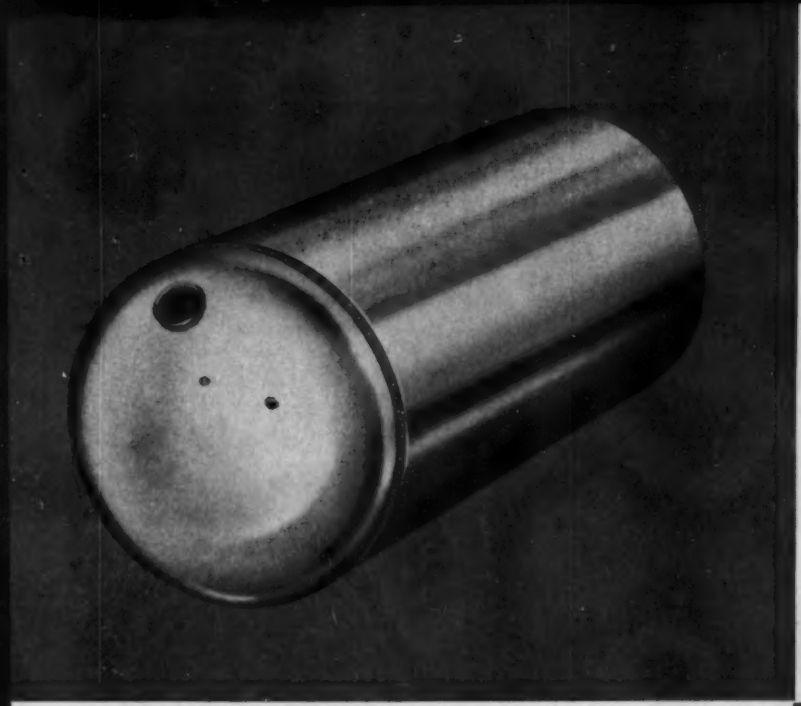
These are the features that make the difference in counterbores—six reasons why no one reports failure of a Continental Counterbore Drive!

Continental CTW TOOL WORKS DIVISION OF EX-CELL-O CORPORATION DETROIT 32, MICHIGAN 60-45

REPUBLIC PH STAINLESS STEELS

REPUBLIC A-286

In addition to excellent corrosion resistance, this precipitation hardenable grade is designed to afford elevated temperature creep and stress rupture strength to over 1200°F. Because it is used on critical applications, majority of tonnage produced is processed from ingots that have been vacuum melted by Republic's consumable electrode process. Typical applications: jet engine and gas turbine components such as wheels, blades, frames, housings, afterburners, tail cone parts, and fasteners.



REPUBLIC 17-7 PH* and PH 15-7 Mo*

These steels possess the cold formability of austenitic stainless grades . . . the hardenability of martensitic grades. High strength levels and good creep resistance are maintained at temperatures to over 700°F. and 900°F. respectively. Typical applications: aircraft and advanced missile structural parts, bellows, hose clamps, leaf springs and spring clips, pressure tanks, surgical instruments, antennae.

REPUBLIC 17-4 PH*

Simple heat treatment after fabrication develops high strength levels without excessive distortion or scaling. Unlike most martensitic chromium types, Republic 17-4 PH* is welded without preheating or post annealing, thus resulting in lower fabricating costs. Typical applications: bearings, bolts, shafts, aircraft fittings, gears, splines, mandrels, pins, seats, and valves.

BECAUSE THEY OFFER GREATER VERSATILITY, precipitation hardenable stainless steels broaden the already wide field of stainless steel applicability. Better properties at elevated temperatures are coupled with the formability and corrosion resistance of other stainless grades. Republic PH Stainless Steels are available in the standard mill products. Mail coupon for data.

REPUBLIC STEEL

Cleveland 1, Ohio

REPUBLIC HAS THE FEEL FOR MODERN STEEL

Strong, Modern, Dependable

**Licensed under Pat. Nos. 2482096, 2505763 and Trade Mark of Licensor.*

CIRCLE 208 READER SERVICE CARD

REPUBLIC STEEL CORPORATION
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Please send more information on:

☐ Republic 17-7 PH and PH 15-7 Mo
☐ Republic 17-4 PH ☐ Republic A-286

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

Are You getting the advantages of 'GROUND-TO-GRINDING' QUALITY CONTROL?

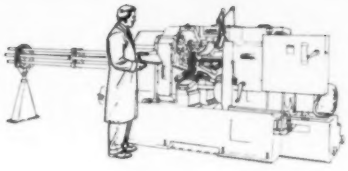
In cutting action, wheel life and production economies, Simonds grinding wheels give you top value. The reason? Control . . . complete quality control starting with abrasive grain manufactured by Simonds Canada Abrasive Co. Ltd. . . . single-management quality control extending to the finished wheels . . . single-source quality control backed by our technical engineering service . . . in short, ground-to-grinding control that gives Simonds wheels that *extra* efficiency to give your products *extra* value. New illustrated catalog gives the specific advantages. Write for copy on your letterhead.

SIMONDS ABRASIVE CO.

your "buy-pass" to better grinding
CALL YOUR SIMONDS DISTRIBUTOR
helping YOUR business is HIS business

WEST COAST PLANT: EL MONTE, CALIF. — BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO SHREVEPORT — IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC

The newest bar machines *are New Britains*



How much work can you wring out of a bar machine? It depends on the machine, how it's tooled and who's using it. New Britain's New-Series Bar Machines are setting some pretty enviable productivity records right now. These machines, redesigned from the ground up, are the most advanced units of their kind available to the metalworking industry.

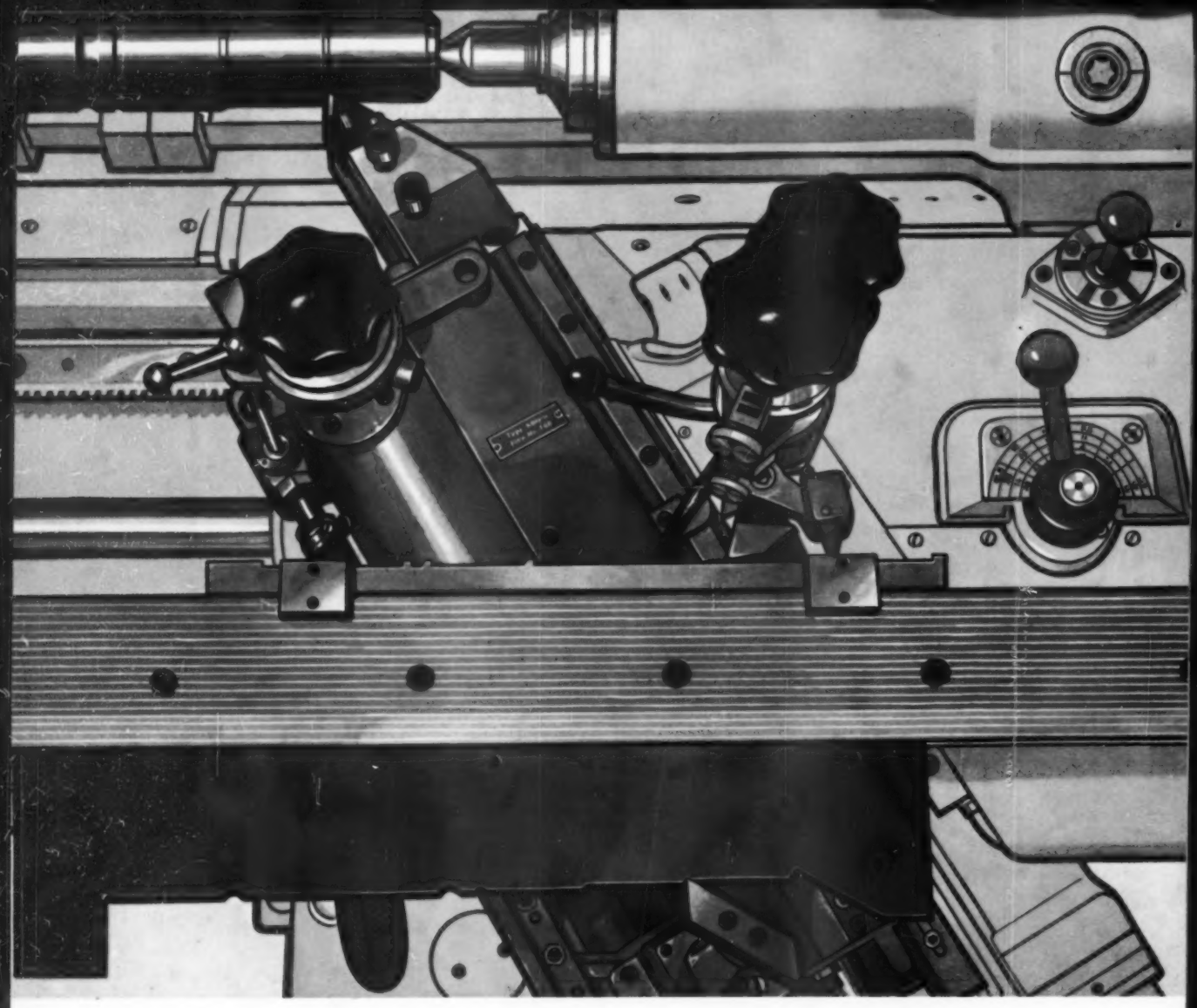
The four-spindle machines have capacity up to 5⅛" and all the massiveness and power needed to turn work of this size.

New series six-spindle machines in various models have capacities ranging up to 3½". The eight-spindle machines take work to 2⅝" capacity.

Increased capacity is only part of the story. Tooling combinations are practically limitless. With end-working and cross slide tooling in every position on every model, the greatest possible variety of operations can be performed to the highest order of accuracy. Numerous familiar New Britain features, like spindle carrier lifting and locating, have been retained and improved. A great many exclusive new features have been added.

Why not send for our new catalogs which give the whole story in detail or call your New Britain representative to arrange a demonstration?

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division • New Britain, Connecticut



Fast set-up, quick changeover *with New Britain +GF+ copying lathes*

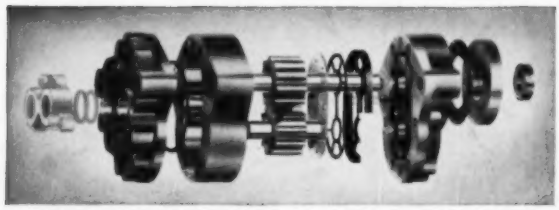
The basic design of a New Britain **+GF+** copying lathe can start to save you money on the first job you put on it. Because the single tool is guided by either a prototype or a template, set-up time is reduced to minutes. The single tool can be changed in minutes, too. Every dimension is positively transmitted from template or prototype to the work, making adjustment a simple matter of bringing only one dimension to size. A **+GF+** does a great variety of work—shafts, chucking work, internal *and* external copy turning. Backfacing is accomplished by a simple attachment. Multi-cut recycling for the removal of heavy stock concentration can also be provided.

The versatility of application is pretty much limited only by the ingenuity of the individual. For more complicated jobs, New Britain can provide the most complete selection of steadies, special tooling attachments and other accessories available for any lathe anywhere. A complete range of models and sizes is available. Why not write for our new **+GF+** copying lathe catalog?

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division • New Britain, Connecticut

Precisionaire gages qualify parts and tolerances to tenths on as many as ten simultaneous dimension readings.

This fleet of PRECISIONAIRE® gages...
controls Cessna quality at the machines



Six models of this Cessna hydraulic pump, used on farm and construction equipment, are gaged during production.

Honing machine operator checks valve body bore at 9 points at once, determines .0001" classifications.

"Without the proper type and quantity of gaging equipment, we never would have been able to produce such high quality hydraulic pumps, valves, and cylinders at such low relative costs," reports the Industrial Products Division of Cessna Aircraft Company.

Knowing that bad pumps correlate with lack of gaging equipment, Cessna has a complete set of gages for each model pump, ready to roll to the machines for quick setup and start of production. Thirty-five rolling gage cabinets, carrying more than 400 Precisionaire columns, are used in the production of these pumps.

All pump parts are produced to be completely interchangeable—there is no classifying or selective fitting. This results in minimum investment in parts inventory, a very rapid rate of assembly, and practically no reworks.

Interchangeable parts greatly simplify replacement problems. Inventory is at an irreducible minimum, service problems are negligible, and users are happy with the minimum maintenance and maximum performance of the pumps.

Write for The Cessna Story and Precisionaire Catalog SPG-160. The Sheffield Corporation, Dayton 1, Ohio.

The **SHEFFIELD** Corporation Dayton 1, Ohio

A subsidiary of The Bendix Corporation

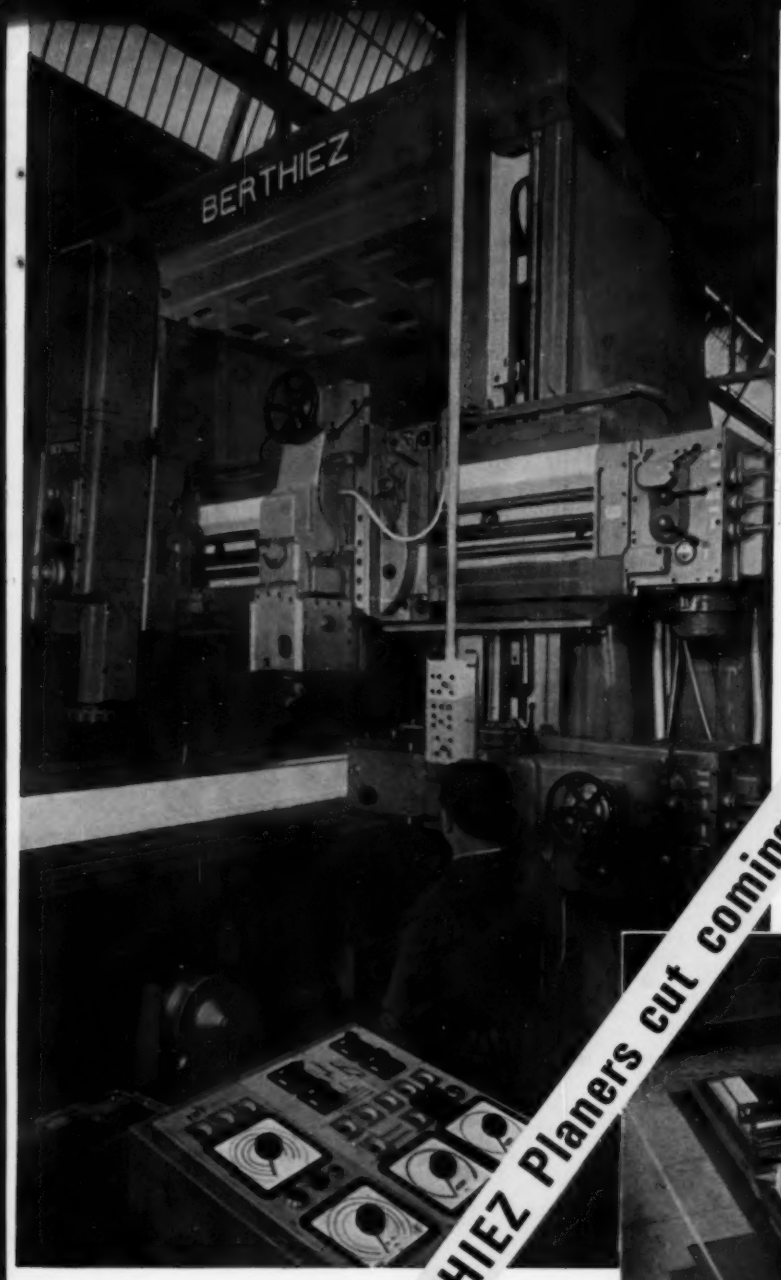
Inspection Gages, Dimensional Control Instruments, Machine Controls, Automatic Gaging & Assembly Systems, Measuray® X-Ray Thickness Measuring, Crushtrue® & Multiform® Grinders, Cavitron® Ultrasonic Machine Tools, Press-Pacer® Transfer Units, Large Dies, Tooling, Contract Manufacturing.

LAPOINTE *is the exclusive*

representative for BERTHIEZ

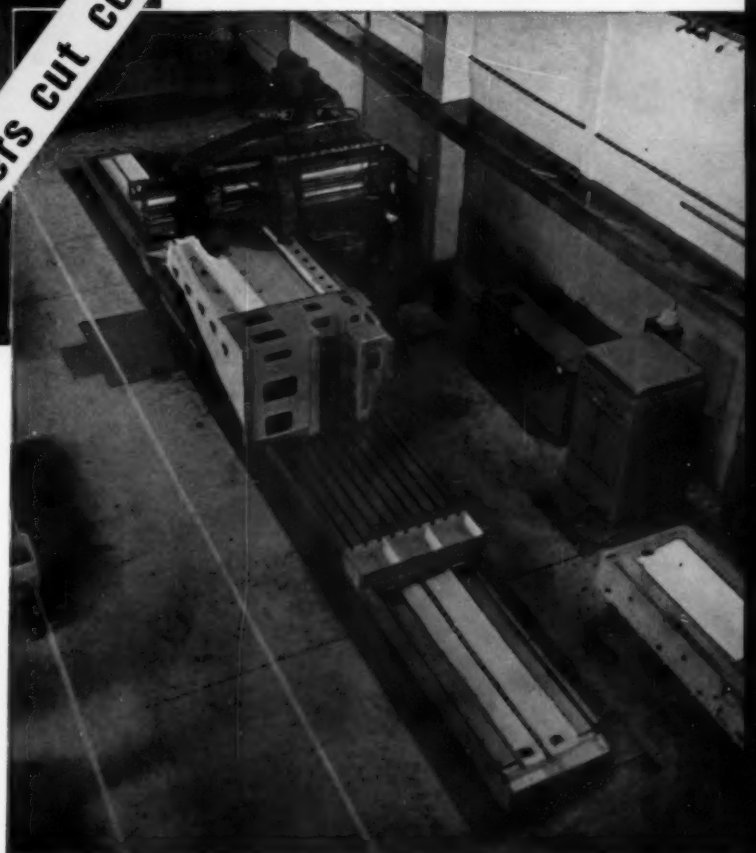
in the United States

LAPOINTE MACHINE COMPANY
Hudson • Massachusetts
Offices in Principal Cities



SINGLE and DOUBLE UPRIGHT PLANERS and PLANO-MILLING MACHINES

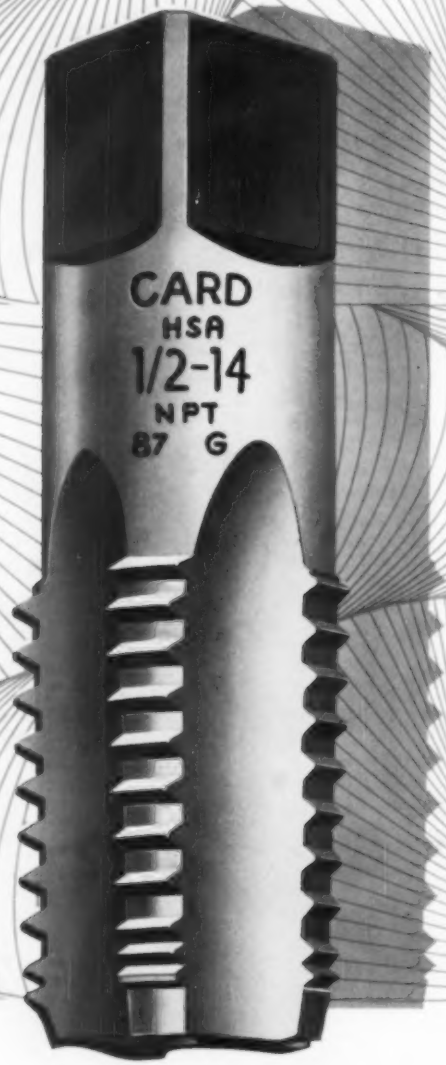
All BERTHIEZ Planers cut coming and going



BERTHIEZ

Société Anonyme des Anciens Etablissements Charles BERTHIEZ Givors (Rhône)

CIRCLE 214 READER SERVICE CARD



TAPS
DIES
GAGES
SCREW PLATES

GEOMETRIC PROGRESSION symbolizes the precise duplication you need in cutting tools. CARD makes sure you get this production advantage in actual form ... through expert engineering that reproduces CARD tools exactly, plus helpful service from your CARD distributor and the CARD technical man, who are quickly available in the nation-wide CARD network. S. W. CARD DIVISION, Union Twist Drill Company, Mansfield, Mass. CARD Warehouses: Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

CARD

CIRCLE 215 READER SERVICE CARD

300.1.2

GEOMETRIC PROGRESSION SYMBOLIZES PRECISE DUPLICATION.

DRILLS
REAMERS
MILLING CUTTERS
END MILLS
GEAR CUTTERS
HOBS
CARBIDE TOOLS
INSERTED BLADE CUTTERS

UTD

FOLLOWING A PATTERN of geometric progression, UNION cutting tools of the same type and size are exactly duplicated... in quality, dimensions and precision performance. They are calculated to cut costs ... your costs ... in the widest range of cutting tool operations. UNION distributors and technical service are available nationally. Fully stocked UNION warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco. UNION TWIST DRILL COMPANY, Athol, Mass. S. W. Card Div., Mansfield, Mass. Butterfield Division, Derby Line, Vermont.

UNION

CIRCLE 216 READER SERVICE CARD

36.1.18

Mobil cuts costs at Chain Belt

At its Milwaukee plant, Chain Belt employs 28 in-plant materials handling units such as this vehicular crane. About two years ago, by changing to premium Mobil motor oil and grease, Chain Belt was able to extend oil change and greasing intervals on this automotive equipment. Resultant reduction of oil changes and grease jobs, plus oil filter savings, has amounted to $905.

Mobil

...latest savings $14,679 !

Having produced savings at Chain Belt Company for 20 years, the Mobil Program continues to cut lubrication costs further, reduce parts failures even more . . . has saved an extra $14,679 in the past 3 years!

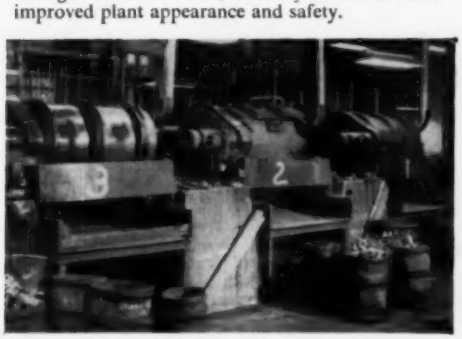
The broad scope of Chain Belt's operation poses complex and unusual lubrication problems. One of the world's largest manufacturers of chains and sprockets and a pioneer in the field of power transmission, this Milwaukee company is also a leading producer of bulk material handling equipment, water sewage and waste treatment equipment, construction machinery and self-aligning roller bearings.

20 years ago, Chain Belt became one of the first industrial concerns to adopt the unique maintenance concept pioneered by Mobil—the Mobil Program of Correct Lubrication. Through Program methods, including a periodic review of oil analysis results, purchase practices, and lubrication intervals, Mobil Engineers continue to produce more efficient operation and new savings in a wide variety of areas. Overall, Chain Belt has effected savings of $14,679 in the past 3 years. Details of specific savings are discussed on these pages.

How is it possible for a lubrication program to produce cost reductions like this? Ask your Mobil Representative for the full details. Mobil Oil Company, 150 East 42nd Street, New York 17, New York.

Leakage, make-up costs, frequent refillings and hazardous footing resulted from the use of a conventional lubricant in the automatic oilers on punch presses. At Mobil's suggestion, a change to a semi-fluid grease has saved $5,808 in 3 years . . . has also improved plant appearance and safety.

Periodic bearing failures on two carburizer furnaces were traced by Mobil to lubricant melt-out upon exposure to the 400° F. temperature above the furnaces. Substitution of a newly developed high temperature Mobil grease has reduced failures and cut application costs by $766 in 3 years.



Chain Belt employs several tumblers in its foundry to clean sand and burrs from castings. Heavy shock loads contributed to periodic failure of gear-head motor drives. A change to a new Mobil lubricant cut failures in half . . . saved $7,200 in labor and parts costs in a 3-year period.

Mobil also provides products and service for equipment manufactured by Chain Belt. Here, new Rex belt conveyor idlers are filled with a Mobil grease which protects against entrance of dirt and water during storage. Mobil rust preventive is also used to treat 4 million feet of chain annually.

Correct Lubrication

IF COMPETITORS MATCH YOU IN PRICE AND QUALITY...

the *LOCTITE* method can give you a double edge

The LOCTITE Method is a bold new approach in metalworking assembly. It reduces rejects, machining time, assembly failure, customer complaints . . . saves on parts and inventory.

Here's what it does: LOCTITE Sealant improves the reliability of press fits and increases their strength—replaces all sizes of lock nuts, screws and washers, jam nuts and interference threads—secures screws and locks studs—seals joints against high-pressure fluids—holds gears, rotors, armatures and fans to shafts.

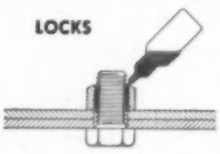
And it does this without a penny invested in equipment. LOCTITE Sealant is simple to use. It can be applied to assembled parts or applied to parts prior to assembly. The plastic container is the applicator. Where desirable, automatic or mass application procedures can easily be set up with "around-the-shop" parts and materials.

What is LOCTITE: LOCTITE Sealant is a penetrating liquid resin that hardens when confined between closely fitted metal parts. It "wicks in" between the most closely mated of matched precision surfaces and hardens into a strong, heat-, oil-, grease-, solvent- and vibration-resistant bond. There are no solvents to evaporate—no catalyst to mix.

Want to reduce costs of your production assemblies? Press fits depend on costly precise tolerances . . . the LOCTITE Method does not. LOCTITE makes a slip fit as strong as a press fit and a press fit still stronger. Thus it can be used to relax tolerances and to improve reliability. Here's one example: An anti-friction bearing with a press fit required 6,000 lbs. to remove it from its housing, while with a slip-fit and the application of a few drops of LOCTITE *it took 8,000 lbs. to remove the same bearing!*

Wherever metals are LOCKED—RETAINED—SEALED in your production assemblies, there is an opportunity to cut costs and realize better profits with the LOCTITE Sealant Method. Details on your application bring immediate response from our Application Engineering Dept. Write today.

LOCTITE GIVES YOU A DOUBLE EDGE—PRODUCTION ASSEMBLY SAVINGS AND GREATER RELIABILITY.



LOCTITE® SEALANT

American Sealants Company • 121 North Mountain Road
Hartford 11, Connecticut

CIRCLE 219 READER SERVICE CARD

CIRCLE 220 READER SERVICE CARD ►

INDUSTRY'S **FIFTH COLUMN**

Tunnel vision! Restricted outlook! Tunnel vision acts as a fifth column in America's war for economic survival. It causes **management** to see only the balance sheet and ignore the pressing need to retool. It causes **labor** to picture only pay hikes without compensating productivity. It causes **government** to kill, with unrealistic depreciation allowances, the goose that lays its golden tax eggs. Tunnel vision distorts American industry. Let's open our eyes. It's later than we think.

A machine tool is only as good as the CUTTING TOOL it drives. The industrialist who "economizes" on a cutting tool defrauds himself—not only of machining accuracy but of the increased production and resulting profits which can be delivered. Pratt & Whitney Cutting Tools will bring out the best in your machine tools, will help win **your** battle for economic survival.

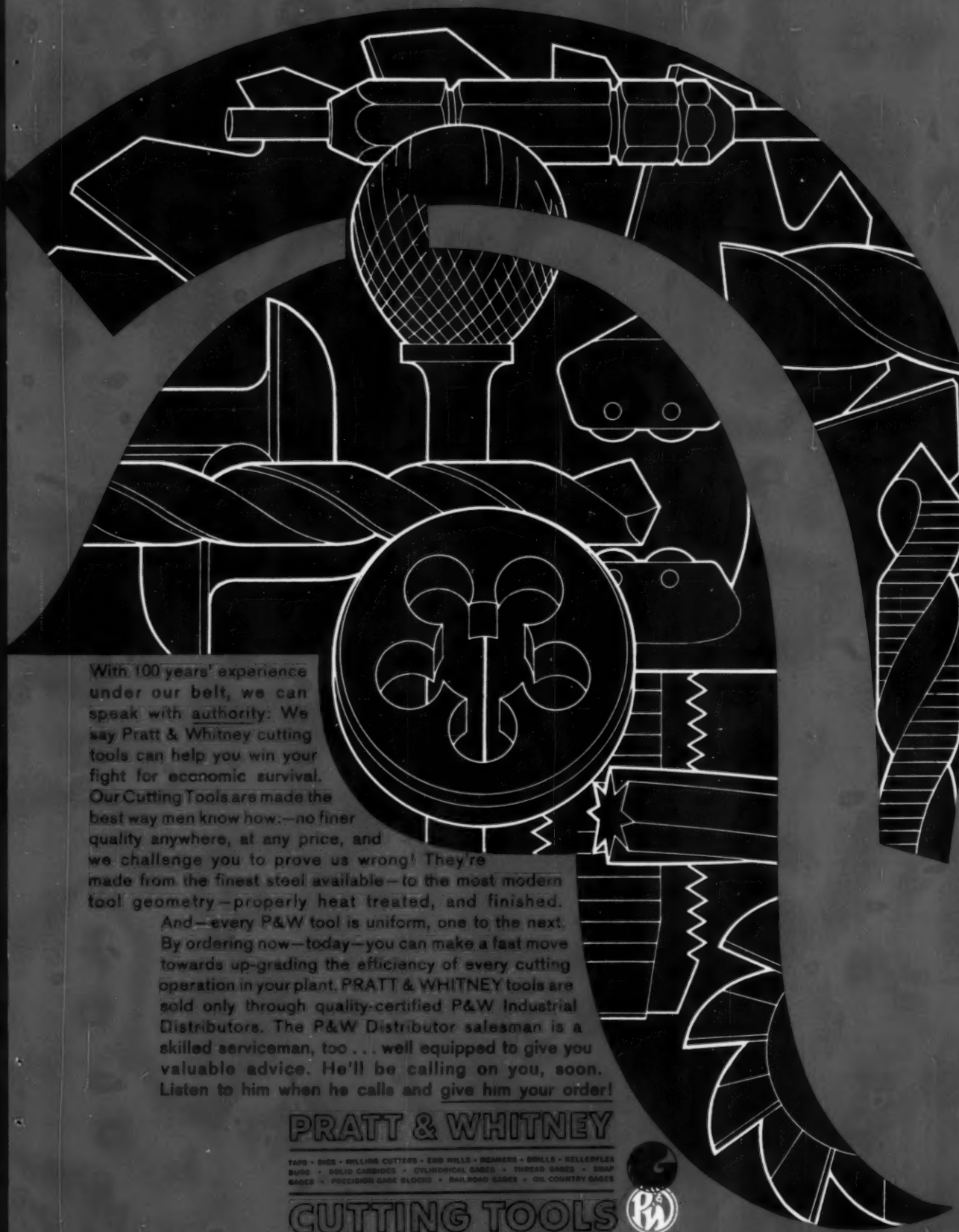
Pratt & Whitney

HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

machine tools / cutting tools / gages

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

WANTED NOW!
CUSTOMERS WHO WANT TO WIN
THE FIGHT FOR SURVIVAL



With 100 years' experience under our belt, we can speak with authority: We say Pratt & Whitney cutting tools can help you win your fight for economic survival. Our Cutting Tools are made the best way men know how:—no finer quality anywhere, at any price, and we challenge you to prove us wrong! They're made from the finest steel available—to the most modern tool geometry—properly heat treated, and finished.

And—every P&W tool is uniform, one to the next. By ordering now—today—you can make a fast move towards up-grading the efficiency of every cutting operation in your plant. PRATT & WHITNEY tools are sold only through quality-certified P&W Industrial Distributors. The P&W Distributor salesman is a skilled serviceman, too . . . well equipped to give you valuable advice. He'll be calling on you, soon. Listen to him when he calls and give him your order!

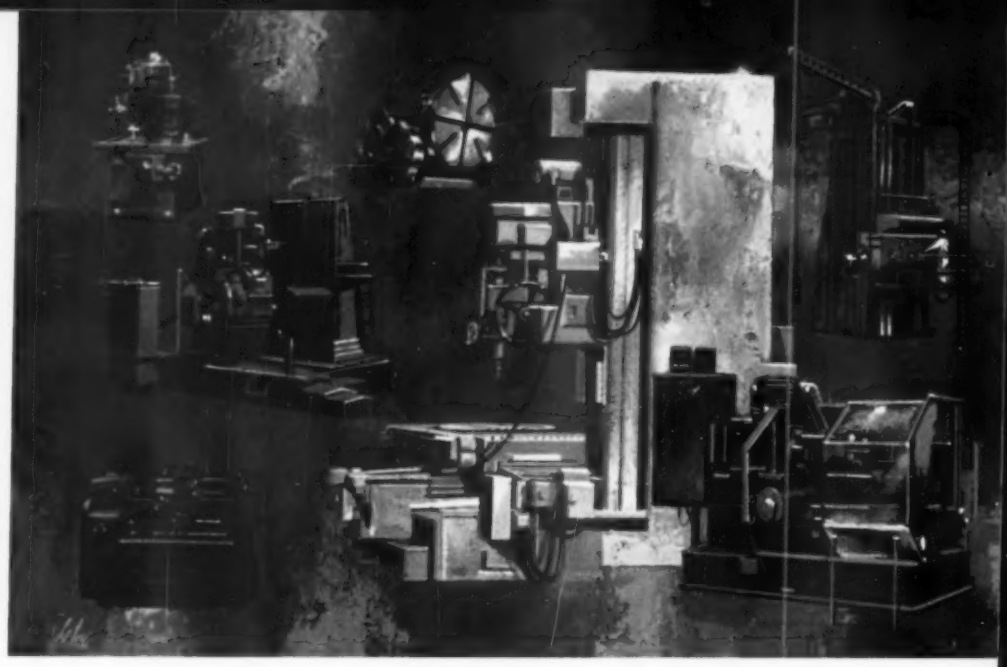
PRATT & WHITNEY

TAPS • DIES • MILLING CUTTERS • END MILLS • REAMERS • DRILLS • KELLERFLEX DUDS • SOLID CARBIDES • CYLINDRICAL GAGES • THREAD GAGES • SNAP GAGES • PRECISION GAGE BLOCKS • RAILROAD GAGES • OIL COUNTRY GAGES

CUTTING TOOLS

P&W MACHINE TOOLS

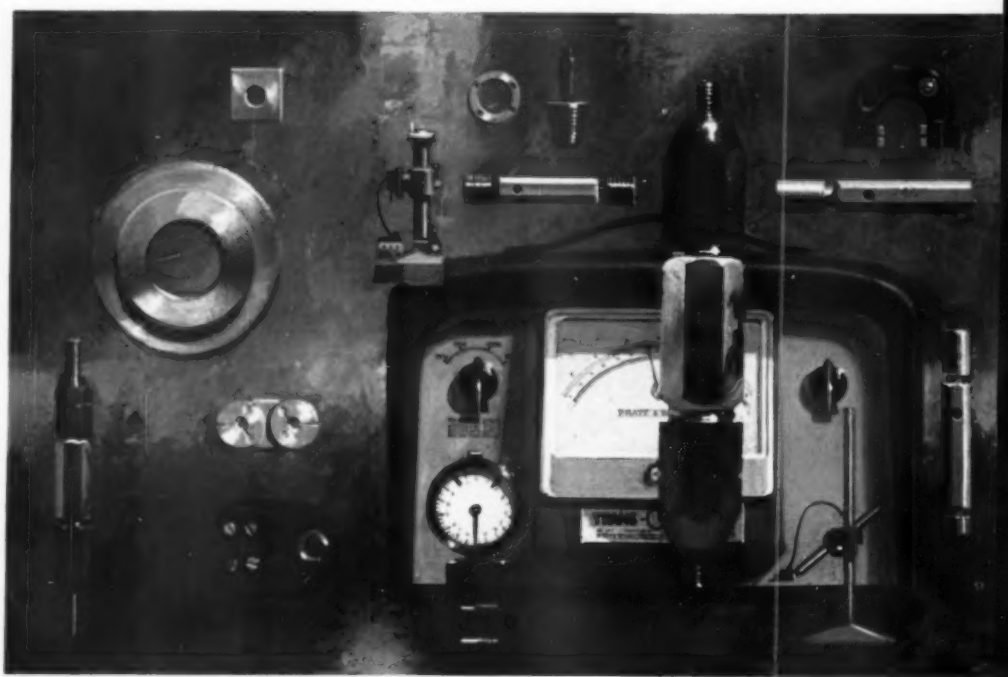
Are you producing prototypes, dies, large or small lots of production parts? Ultra-precision locating (to "tenths" accuracy)? Boring, profile milling (with or without masters)? All these and countless other problems can be solved with P&W machine tools at production line speed, efficiency and economy. Machines such as the world-famous P&W KELLER,® P&W JIG BORER, P&W ROTARY TABLE and P&W POTTER & JOHNSON AUTOMATIC TURRET LATHE are available with manual or numerical controls in a variety of models to fit your needs. P&W can also supply the MAGNETRACE PROFILER, SIM LATHE, INNOCENTI-MITSUBISHI MILL and the DIAFORM WHEEL FORMING ATTACHMENT...high grade performers all. For more information ask your P&W representative.



IN YOUR FIGHT TO **SURVIVE** YOU NEED THE FINEST WEAPONS

P&W GAGES

More than ever, production efficiency depends on fast, precise, economical gaging. P&W supplies all types of gaging equipment. Thus, you can choose those that do your job at lowest cost... from simple CONVENTIONAL GAGES to the most intricate tape-controlled INSTRUMENT GAGES. Types include PLUG, RING, THREAD and SNAP GAGES, INTERNAL and EXTERNAL COMPARATORS, and PRECISION GAGE BLOCKS... all available through selected Industrial Distributors. The exclusive series of AIR-O-LIMIT,® TRANS-O-LIMIT® and DATA-LIMIT® gages and famous "FLYING MIKE" CONTINUOUS GAGE are available from your P&W representative. Bring your gaging problems to him.



MACHINE TOOLS – CUTTING TOOLS – GAGES • HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

PRATT & WHITNEY

A MAJOR INDUSTRIAL COMPONENT OF

FAIRBANKS WHITNEY

PRATT & WHITNEY COMPANY, INCORPORATED, CHARTER OAK BOULEVARD, WEST HARTFORD, CONNECTICUT

Announcing
CARMET®

700

Series Cutting Grades

to boost production–extend tool life up to 200%

If you're tooling-up for a really tough cut, try Carmet's new 700 Series Cutting Grades. Make one super-duty tool do the work of two or three—on any steelcutting job, including superalloys.

Carmet's 700 Series is a new, premium group of carbide grades just released after exhaustive field trials. Results were conclusive. These carbides stood up under the roughest interrupted cuts going. They gave longer tool life than competitive grades in the same application class. And, they produced exceptionally fine finish cuts, even in C-8 precision boring classifications.

Here are the 700 Series Steelcutting Grades, and their applications:

CA-704 Hard and dense for the ultimate in finish cuts and precision boring.

CA-711 Ideal for medium to finish cuts in the general purpose category.

CA-720 Tough and thermal shock-resistant for medium and heavy cuts, including interrupted cuts.

These new Carmet Grades combine edge wear and crater resistance with an unmatched ability to endure shock. The 700 Series will outperform other groups of tools in any C-5 to C-8 application. Take a look at a few customer trial reports:

"Turning tapered, slotted, forged SAE 4140 valve plugs . . . formerly got 8 finished pieces per cutting edge. Now get up to 25 pieces with CA-720 on a tough, interrupted cut!"

"Turning OD of universal joint ears . . . now getting 177 pieces with CA-720 against 135 with former tool."

"On SAE 1035 rotor shafts . . . got 7 more shafts per tool with CA-711. And K Monel shafts . . . got more from 9 CA-711 tool corners than 12 corners on triangular inserts formerly used."

"On SAE 4320 forgings . . . a whopping 242 pieces with CA-720, against 209 with previous Carmet 600 Grade, 198 with best competing tool."

Remember, for less demanding operations, the 600 Series Cutting Tools will continue to be sold by Carmet. But for the really tough cut . . . when you've got to make chips on a mean, tool-buster of a job . . . this kind of performance from the 700 Series will save you time. And, cost you less than competing premium grades!

They're doing just that in shops all over the country . . . right now! Try them, just once, on your job. Your local Carmet Distributor has them in stock. Contact him for more information, or write: ***Carmet Division, Allegheny Ludlum Steel Corporation, Ferndale, Detroit 20, Michigan. Dept. AM-4.***

CARMET 700 SERIES CATALOG SUPPLEMENT NOW AVAILABLE

There's a new Supplement to the Carmet Catalog C-16-8, listing tool and insert styles, and prices for the new 700 Series. Contact your local distributor, or write Carmet direct.

2698

CARMET® AL

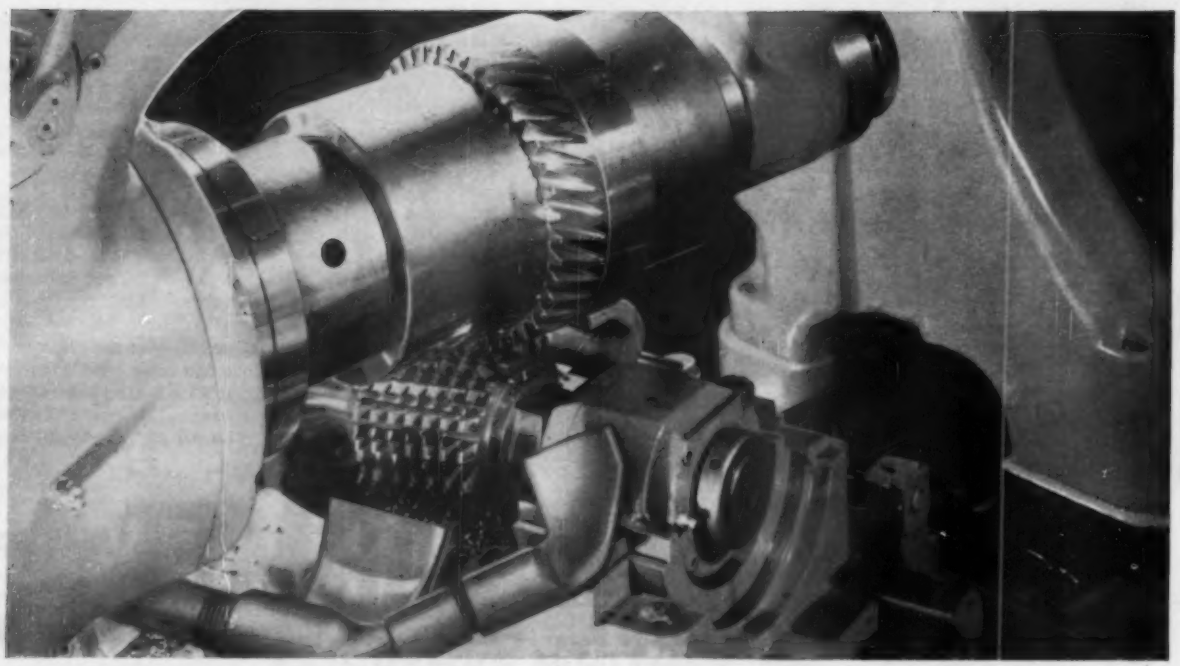
CEMENTED CARBIDE · DIVISION OF ALLEGHENY LUDLUM

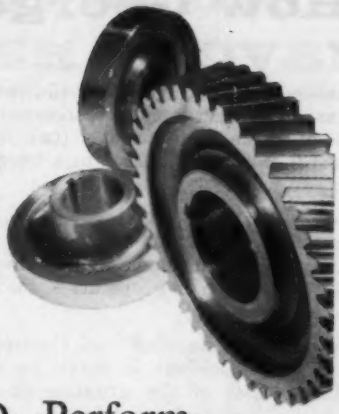
◄ CIRCLE 223 READER SERVICE CARD

CIRCLE 224 READER SERVICE CARD

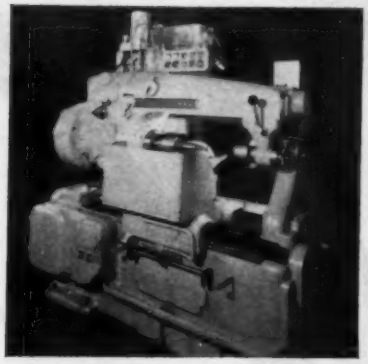
NEW WAYS TO SPEED PRODUCTION OF HIGH-QUALITY COARSE-PITCH GEARS This Barber-Colman No. 14-15 hobbing machine is FAST. It produces two 6 D.P., 41-tooth helical gears (1½-in. face) in 3 minutes, 50 seconds. Finish and lead accuracy are excellent. It takes a machine with plenty of capacity, rigidity, and precision to combine this kind of accuracy with high production. Here's how. Bayonet-lock hydraulic tooling, antifriction spindle bearings, and optional DUAL-FEED all slash important seconds from the cutting cycle. Speed of the 5-in. dia hobs, which have three threads and 20 flutes, is 313 rpm. Although index speed is high, generating

PRODU





flats are minimized by the number of teeth cutting. An approach feed of .080 ipr shortens the approach cycle. When the hob reaches full depth, feed drops automatically to .045 ipr. Thus, excellent finish is produced



at MAXIMUM SPEED. Performance like this is what makes the Barber-Colman No. 14-15 America's leading coarse-pitch hobber. Its superiority can be measured in economy, versatility, capacity, and accuracy . . . as well as in convenience,

CTIVITY

service, quality, and productivity. And this Dual-Feed model is just one of several important new concepts you can see demonstrated in a visit to our TEST CENTER.

Your Barber-Colman representative will make all the arrangements.

BARBER-COLMAN COMPANY

BARBER COLMAN

41 LOOMIS STREET

ROCKFORD, ILLINOIS

How George Deickert upped grinding

Watchmakers have nothing on the builders of Marion power shovels as far as accuracy is concerned. Some of the shafts on Marion's biggest shovel (two full carloads in a single scoop!) have to be finished to a tolerance of ±.0004" on bearing surfaces.

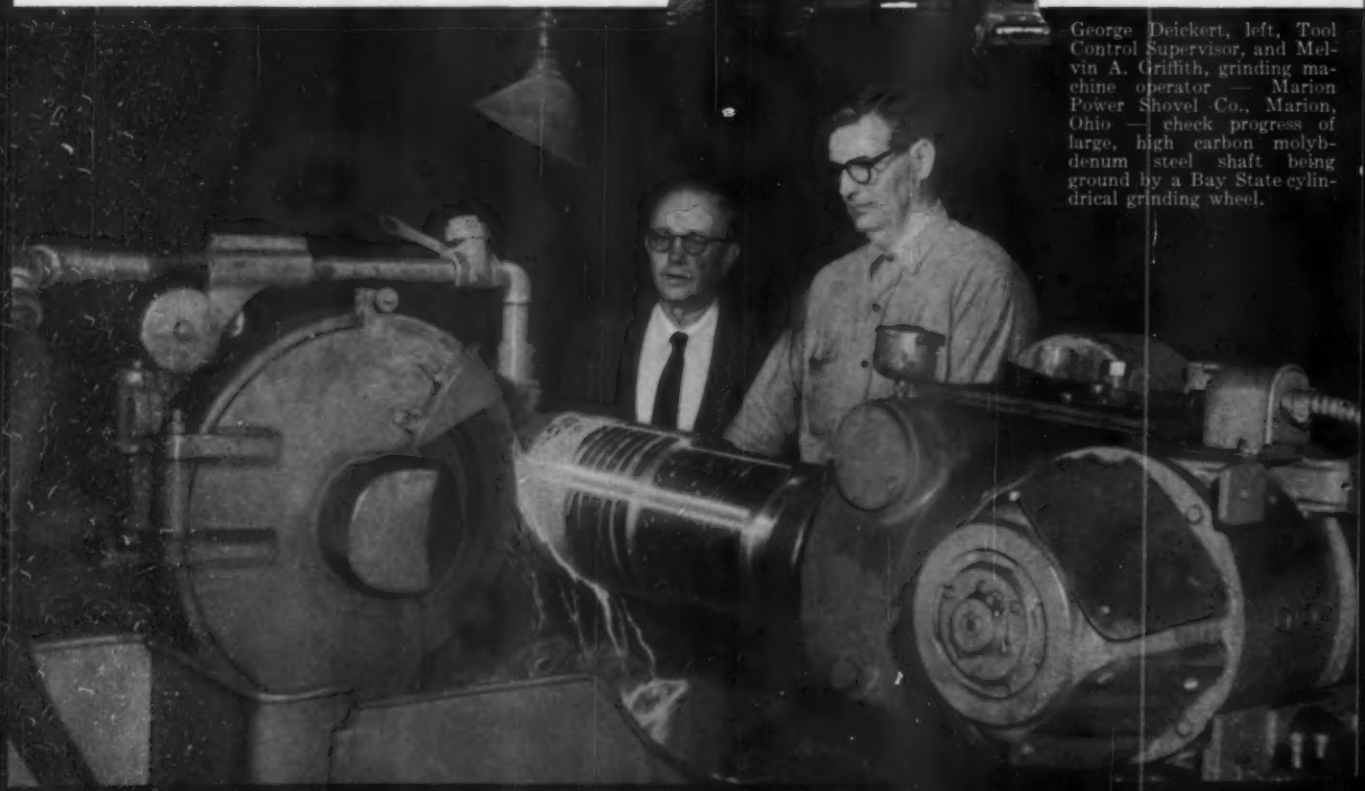
The sheer size of these grinding jobs staggers the imagination too. The steel shafts run up to 12 ft. long and 14" in diameter so a tremendous amount of metal has to be removed and the grinding operation accounts for a substantial chunk of costs.

That's where an outstanding Tool Control Supervisor like Marion's George Deickert is worth his weight in dollar bills. His analysis of the situation showed five major deficiencies in the wheels used for the job and he wasted no time turning dissatisfaction into action. He called in Bay State Abrasive Specialist Dick Crofoot and went over the whole problem with him in detail. Crofoot went to work with the engineering staff at Westboro and came up with a specification that did both grinding and finishing *and* ensured: (1) 30% faster stock removal. (2) Excellent instead of poor size control . . . *easily within* the ± .0004" tolerance. (3) Consistent finish at 20 RMS. (4) 50% less dressing. (5) Greatly improved wheel life. (6) Consistent duplication of performance, wheel after wheel.

As George Deickert himself says: "This isn't the only job that Bay State has done well on for us. We have dozens of different types of grinding jobs . . . and we use a great many different types of wheels, including tool wheels. Bay State not only does a lot of jobs for us and does them well . . . they have also been able to duplicate excellent first performances with their follow-up wheels."

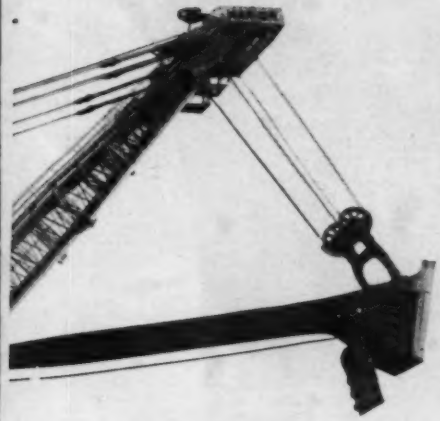
If your grinding operations . . . large, small or micro-miniature . . . are less than 100% efficient by current standards of abrasive technology, your Bay State distributor or direct representative is thoroughly trained and fully equipped to work out practical improvements for you. *Better grinding at lower cost . . . that is his business.*

One of the biggest excavators ever built, Marion Power Shovel Company's Type 5761 "Stripmaster" can dig 65 cu. yards at a time, fill two railroad cars with a single dipperful.



George Deickert, left, Tool Control Supervisor, and Melvin A. Griffith, grinding machine operator — Marion Power Shovel Co., Marion, Ohio — check progress of large, high carbon molybdenum steel shaft being ground by a Bay State cylindrical grinding wheel.

speed 30% and cut dressings by 50% at MARION POWER SHOVEL



George Deickert's background is impressive to put it mildly. His technical training started in Germany with a Masters Degree in steam and combustion engineering from Berlin University. His business career includes hitches with United Carbon Co., and Weston Instrument Co., in Newark, N. J. and fifteen years with Curtiss-Wright in Patterson, N. J. Starting as a Methods Engineer, he's been with Marion Power Shovel since 1947. He has used Bay State wheels since 1932 and says they have never let him down.

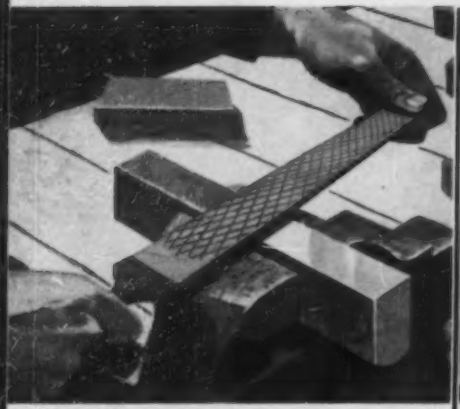
BAY STATE ABRASIVES

BAY STATE ® WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

SIMONDS MEANS SAVINGS WHATEVER YOU CUT

Now Change from



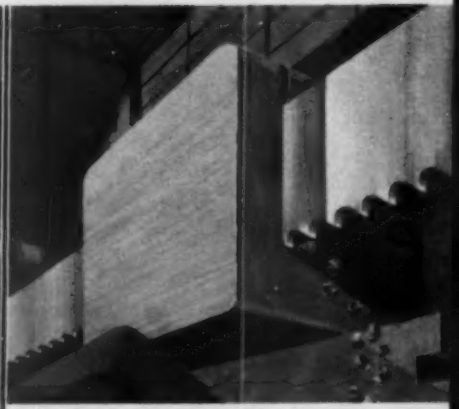
"Red Tang" Files

For faster, easier filing, Simonds "Red Tang" Files are sharper to start with, hog off more metal per stroke. More wear-resistant, too, they keep on cutting long after other files have turned dull and useless.

Simonds Circular Saws

Tops for fast, straight cutting, Simonds Saws are designed and made to stay on the job longer. Available in 5 types: Solid Tooth, Hard Rim, Inserted Tooth, Segmental and Carbide Tipped — for lowest cost cutting of all kinds of metal.

CIRCLE 229 READER SERVICE CARD



Simonds Band Saw Blades

Our new "Super" High Speed Steel Band will give you up to 3 times better performance than any other high speed steel blade you're now using. It's a startling new advance that can substantially reduce your cutting costs.

Hacking to Cutting...

with Simonds "Red End" Hacksaw Blades

Important Cutting Fact! Simonds big "Red End" Hacksaw Blades cut curled *chips* like the cutting tool on a lathe.

Result? You cut faster, you cut straighter — get more work done in far less time.

What's more, Simonds blades are made from tough, cross-rolled steel . . . steel that *stays sharp* longer, resists *breakage*, gives you *many more cuts* per blade!

But don't take our word for it. Test a box of 10 Simonds "Red End" Blades against any 10 others. See for yourself how Simonds will up your cutoff production, lower your blade costs.

Simonds "Red End" Power Blades come in All-Hard and Shatterproof types in all standard lengths, thicknesses and tooth spacing . . . a "right" blade for every job.

Three types of Hand Blades are also furnished in all standard specifications for easier cutting, longer life and lower costs. Call your local Simonds Distributor for prompt delivery or further details.

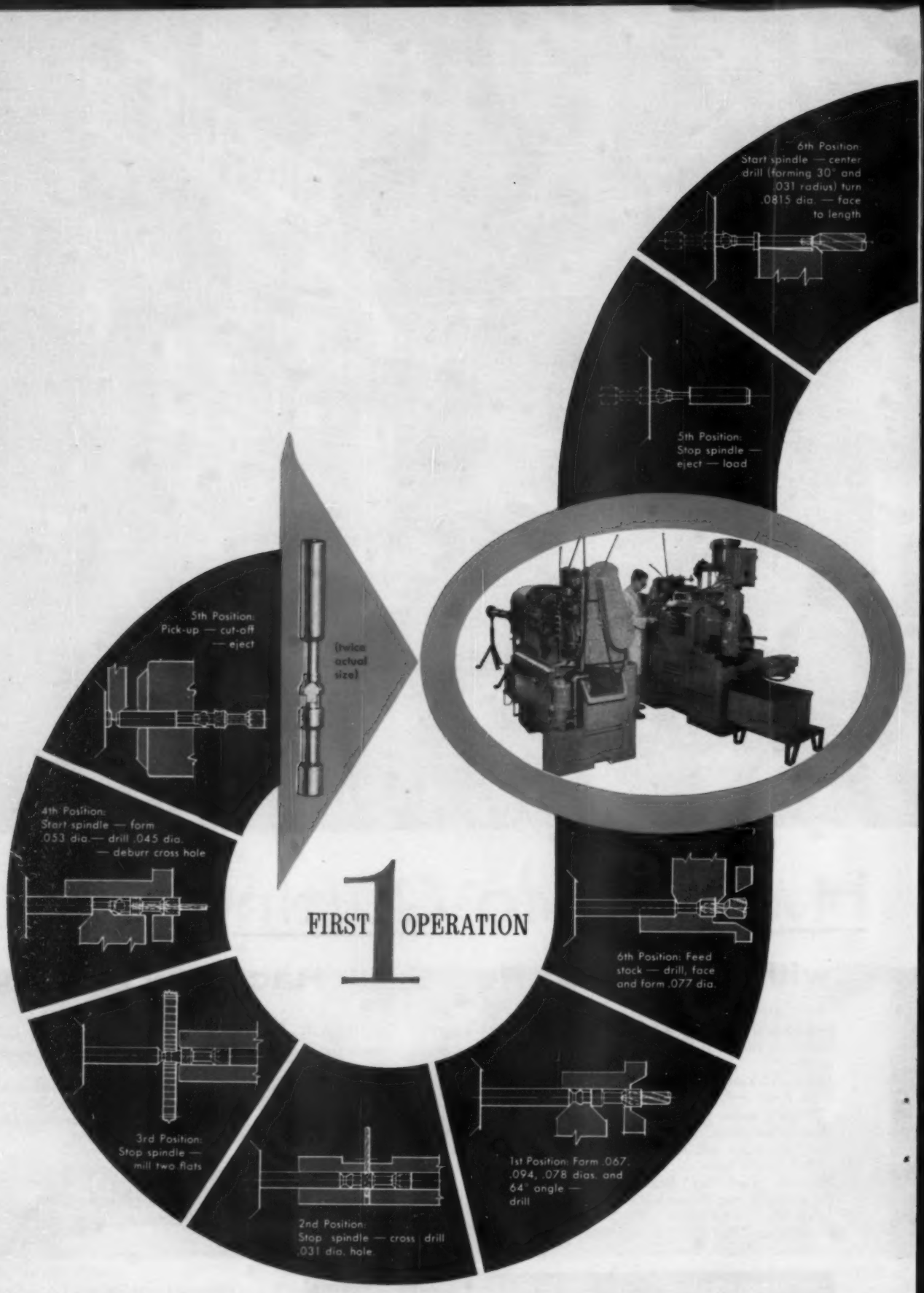
INDUSTRIAL DISTRIBUTORS — THE RIGHT HAND OF PRODUCTION

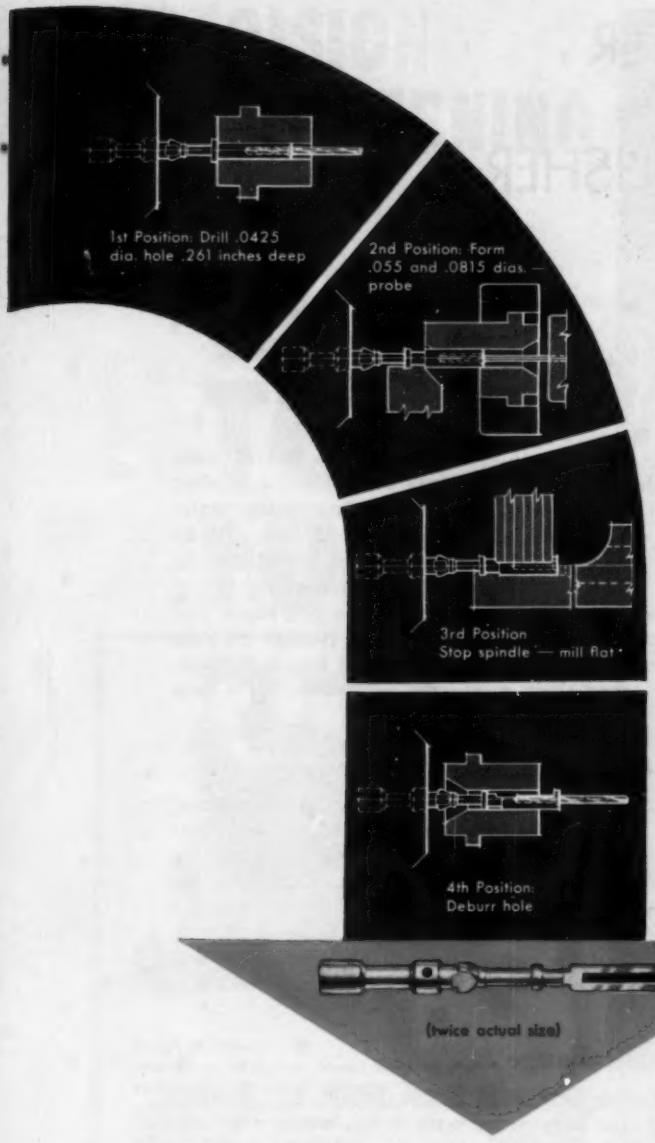
SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASSACHUSETTS

Buy through your local Simonds Distributor for — Local Stocks – Local Speed – Local Skill

Factory Branches in Union, N. J., Chicago, Shreveport, La., Los Angeles, San Francisco, Portland, Ore. • Canadian Factory in Granby, Que. • Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.; Heller Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Philadelphia, Pa. and Arvida, Que., Can.

CIRCLE 230 READER SERVICE CARD


6th Position:
Start spindle — center drill (forming 30° and .031 radius) turn .0815 dia. — face to length
5th Position:
Stop spindle — eject — load
5th Position:
Pick-up — cut-off — eject
4th Position:
Start spindle — form .053 dia. — drill .045 dia. — deburr cross hole
3rd Position:
Stop spindle — mill two flats
2nd Position:
Stop spindle — cross drill .031 dia. hole
1st Position: Form .067, .094, .078 dias. and 64° angle — drill
6th Position: Feed stock — drill, face and form .077 dia.
(twice actual size)
FIRST 1 OPERATION


1st Position: Drill .0425 dia. hole .261 inches deep
2nd Position: Form .055 and .0815 dias. — probe
3rd Position Stop spindle — mill flat
4th Position: Deburr hole
(twice actual size)

ACME-GRIDLEYS REDUCE MACHINE TIME 80% OPERATOR TIME 70%

...FOR SCINTILLA DIVISION OF THE BENDIX CORPORATION

When it comes to economically turning out large quantities of identical precision parts, most cost-conscious manufacturers rely on Acme-Gridleys. A good example is one of the nation's leading suppliers of electrical connectors to space age industries, Scintilla Division of The Bendix Corporation, Sidney, New York.

Recently, Scintilla converted production of an electrical contact socket and connector to 7/16" RA-6 Spindle Acme-Gridleys. Working to tolerances of .002 on turned diameters, .005 on concentricities and 50 microinches or better on drilled holes, the Acme-Gridleys reduced per-piece machine time 80% and operator time 70%! There was also a significant reduction in the reject rate.

Savings like this are the big reason Scintilla has close to *seventy* Acme-Gridleys in their modern production setup. In your plant, Acme-Gridleys will pay off in similar cost reductions . . . for years to come.

SECOND 2 OPERATION

The number of different jobs that can be set up on Acme-Gridleys amazes everyone. To give you some idea, we've described some 57 actual jobs in a new 64-page bulletin called "Circumferential Automation at Work". At your request, we'll be happy to send you a copy. Call, write or wire.

National Acme

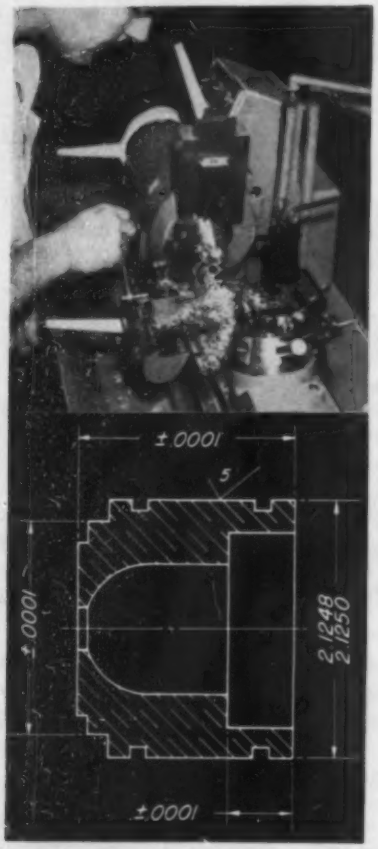
The National Acme Company
171 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

Wade

model 98 LATHE

Built with 2¼" collet capacity and 9" swing, this electric clutch hand turret lathe releases large machines from bar work and from second-operation work that can be performed more economically on this size lathe. Perfectly suited, for example, to the type of exacting work that is required on a potentiometer case. Distance from spindle to turret face (max.) 17"; spindle speeds 80 to 2000, infinitely variable.



Can your lathe do this?

- Turn to a 5 finish
- Hold concentricity .0002" on 5 or 6 diameters
- Perform 7 distinct operations at one chucking
- Take 2¼" bar stock through the collets

Send today
for descriptive bulletin

THE WADE TOOL CO.
53 River Street
WALTHAM 54, MASS.

LETTER from the PUBLISHER

About Change

Not along ago, a machine tool builder friend of mine was talking about the importance of building a product the market wants. He commented, "One of the worst mistakes a company can make is to fall in love with its own product. If it does so, the chances are it will be making that product long after the market no longer wants it." How many manufacturers do you know who have fallen in love with *their* products? Some have gone out of business. Others have awakened barely in time, and have saved their businesses by developing a new product the market will buy.

The danger . . .

You have known *people* like this. They resist change; sometimes to the point of stagnation. When they stagnate, they are finished. A manufacturing man, too, can *fall in love* with a particular machine, technique or way of doing something. The danger is he will be using it long after it is outdated. Such failure to keep up with change can put the cost of making his product so high it is no longer competitive or he can no longer sell it at a profit.

Anticipate change . . .

Manufacturing technology in metalworking is changing so rapidly that keeping up with it is a bigger challenge than ever before. Yet keep up you must if you are to keep your costs down and increase production efficiency.

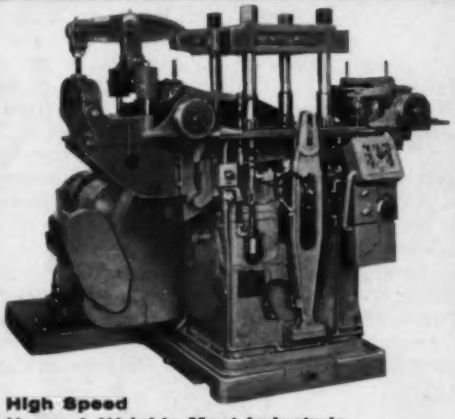
Today, the price of survival is to *anticipate* change. AMERICAN MACHINIST/METALWORKING MANUFACTURING is dedicated to helping you do this.

George Reppert

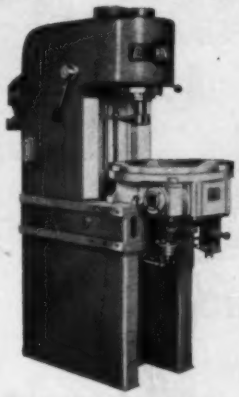
PRECISION STRAIGHTENING WITH 1500 TONS FORCE

The 1500-ton H-P-M FASTRAVERSE press, illustrated, was especially designed for straightening malleable iron castings. The control system provides means for operating the press either semi-automatic or manually. Change-over from one mode of operation to the other may be made in an instant without stopping the press. A safety control automatically prevents the ram from dropping in the event of power failure or loss of pilot pressure. An emergency reverse push button, if depressed during the forward press travel, will cause the press slide to reverse immediately without completing the cycle. For complete engineering experience and a background in specialized press equipment, contact your nearest H-P-M engineer or H-P-M's home office in Mount Gilead, Ohio.

H-137



High Speed Henry & Wrights Meet Industry's Mass Production Needs The efficient and economical production of complex parts, using progressive dies, are best illustrated by the many successful applications of the popular Henry and Wright line. Available in a range of sizes and types to cover the entire market, Henry & Wright Dieing Machines offer the ultimate in safe, high speed forming and stamping presses. They're fast, accurate, easy on dies and readily adapted to high production work of all types. 25 to 500 ton models available.



Low Tonnage Versatility These compact, high speed bench size C-Presses place either manual or automatic press operations within the range of any shop. They're fast, easily set-up for hundreds of dies, do the work of several less-versatile presses because of ease in changing pressure, stroke and ram speed for each job. The C-Press can be the busiest press in your shop. Automatic index table accessories are available for high production parts loading and processing. Send for complete catalog today.

HPM

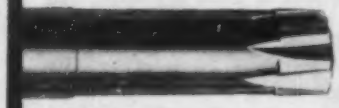
H-P-M

DIVISION
Koehring Company
Mt. Gilead, Ohio, U.S.A.

This, for instance! But wherever you find precision finishing and sizing of holes in metal parts, you'll find L&I reamers on the job—or soon to be.

NEW! The HLB ECONOMY STUB REAMER—the first economy stub reamer for automatic screw machines. New flute design assures cleaner holes and longer tool life. The HLB short flute length eliminates chatter and bell mouth holes. Now available in 89 STANDARD FINISHED SIZES from 1/16" to 1"—right from stock at your L&I Distributors.

Write today for NEW STUB REAMER BROCHURE.



L&I

LAVALLEE & IDE, INC.
"THE REAMER SPECIALISTS"
CHICOPEE, MASSACHUSETTS

LETTERS

to the editors

330 W 42nd St, New York 36, NY

Politics in Trade Policy

YOUR EDITORIAL "OUR DODDERING TRADE POLICY" (*AM/MM*—Mar 20 '61, p115) BRINGS INTO SHARP FOCUS THE GRAVE DAMAGE DONE BY THE INJECTION OF POLITICS INTO OUR INTERNATIONAL BUSINESS RELATIONS. IT FURTHER CARRIES A TIMELY WARNING REGARDING OUR FUTURE HANDLING OF EXPORT POLICY. YOUR EDITORIAL DESERVES NATIONWIDE RECOGNITION.

IF I COULD WRITE SUCH UNIQUE EDITORIALS AS YOURS, I WOULD STOP BUILDING UNIQUE MACHINES THAT CANNOT BE EXPORTED.

N A Leyds, *vice pres & gen mgr*
Bryant Chucking Grinder Co
Springfield, Vt

Clumsy Fractions

Dear Sirs:

Don R King's plea that we drop those clumsy fractions is indeed a compelling one (*AM/MM*—Feb 6 '61, p98). But why not take it a step further?

Being in the 19th percentile in accounting aptitude, I long ago became reconciled to the fact that I cannot add and subtract successfully and began casting about for means of avoiding the necessity. One of these means I carry in my pocket: a decimal-foot tape, presumably available in most engineering supply stores.

Surely it is ridiculous to stick forever to a fundamental length standard divided into 12 parts!

The decimal-foot measure has these advantages in any transitional period: a) it retains as its central unit a length familiar to all, b) 0.01 foot is almost exactly ⅛ inch, which provides a mental point of reference for those of us trained in the foot-pound system.

In much engineering work—particularly erection jobs where one is constantly checking dimensions—there is no need whatever to convert between drawings and

SHOPMATES

N. Jarvis

LET'S SEE NOW— THE CAM WILL MAKE CONTACT HERE AND ACTIVATE THE—
DRAWIN' ON THE FLOOR!!! THAT'LL SAVE ON PAPER BUT IT'LL BE ROUGH ON ERASERS!
YOU NEED A CAPACITOR RIGHT THERE NOW....
N. JARVIS

Don't gamble on lathe work!

Get cost-reducing HYDRASHIFT to insure profits on your present jobs . . . better bids on new jobs

With a Cincinnati HYDRASHIFT, your man can out-produce *any* other lathe operator!* That's because he keeps the machine cutting full time. *He loses no speed-changing time!* And, because it's *easy to change speeds*, he'll use the best RPM for every operation.

HYDRASHIFT is the *only* economy-priced geared head lathe with Power Dial speed shifting! The next desired spindle speed is dialed while the lathe is cutting. At the end of the cut, hydraulic power shifts the speed without the operator leaving the apron.

In addition, HYDRASHIFT has all the other Cincinnati features for speed, accuracy and ruggedness that make it the "most-wanted" lathe in its class!

Ask your Cincinnati Lathe and Tool Distributor for Catalog T-230, or write us direct.

CINCINNATI LATHE AND TOOL CO.

CINCINNATI 9, OHIO

HYDRASHIFT Lathes / CINCINNATI Drilling Machines / SPIROPOINT Drill Sharpener

CINTIMATIC Numerically Controlled Lathes and Drills

VK VAN KEUREN

M-60

Wheel Diameter 6"

THE LIGHT WAVE MICROMETER

A precise measuring instrument • Direct reading on wheel to .0001" • Direct reading on vernier to .000010" • Capacity: 0–2"

new **THE WHEEL** — Graduations in thousandths and ten-thousandths in fine clear markings are easily read on the periphery of the wheel.

new **THE VERNIER** — A simple standard principle, visual type, accurately made, with no moving parts — transparent — no glare — with large clear numerals.

improved **THE LIGHT WAVE INDICATOR** — Insures exact control of measuring pressure. New, easy to read reference marks. Sharp distinct bands on coated optical flat. Makes it possible to detect variations in measurements as fine as two millionths. Operators can repeat another operator's readings to less than ten millionths with ease. Measuring pressure is adjustable from a few ounces to 2½ pounds.

new **THE "0" SETTING** — Simple — fast — no tools. With the spindle in contact with the anvil, set the vernier index to "0" with the adjusting arm.

ANVIL and SPINDLE TIP — Carbide, precision lapped for accuracy and long wear.

PRICE **$495.00** (F.O.B. Watertown, Mass.)
Send for Brochure

THE VAN KEUREN CO.
173 Waltham Street, Watertown 72, Mass.
PRECISION MEASURING TOOLS
. . . rated the world's most accurate

Plug Gages • Measuring Wires • Optical Flats and Light Wave Equipment • Gage Blocks
Precision Lapping Service and Parts

the measurements one is making with his decimal-foot rule. It's twice as fast, too—there's no instinctive pause which we all train ourselves to take to insure that the mark we're looking at is ⅞ and not ⅝ or 13/16, not ¾. (*NOTE: We don't mind admitting that we paused slightly when thinking what 3⅝ in. would be in hundredths of a foot*—Ed)

Of course, the decimal-system proponents, bless 'em, will probably bemoan our timidity and insist that we take the bull by the horns and change over to the most logical of all, the metric system. And they're probably right—if only we could just kill off a complete generation of engineers and pretend that the first 20 years of the change-over didn't exist.

F Gue, *division mfg engineer*
Power Trans & Cir Brkr Div
Canadian Westinghouse
Burlington, Ont

Dear Sirs:

. . . what Mr King proposes is one of my most troublesome headaches.

His system is being used in some manufacturing plants and has been advocated for some time, but I certainly wish that those who advocate it would learn what it means in practice.

When a corner radius or blend radius is expressed in fractions, the machinist or toolmaker can use any standard 1/64-in.-step commercial radius gage for manufacturing and inspecting.

If the drawing calls for a radius of 0.50 to 0.96 in., there immediately is a question as to whether it should be 0.500 and 0.960 in. or something within a few thousandths either way, and it is then necessary for the company to issue a special set of instructions giving their interpretation.

I personally would go along part way with Mr King, meaning that I agree that decimals are a little easier to use. However, I would in such cases also use three-place decimals instead of two-place decimals.

For instance, ½ in. would be written 0.500 in., and 9/16 in. would be written 0.562 in. This would allow the shop to use the standard 1/64-in.-step radius gages and prevent the manufacture of mongrel gages. It would also adequately show the design intent and would permit decimal values throughout the drawing.

Kempton A Eveleth
Clarksville, Ohio

CALENDAR

American Society of Mechanical Engineers—Metals Engineering Conference, Apr 23-26, Penn-Sheraton Hotel, Pittsburgh, Pa.

Metal Powder Industries Federation — Annual Meeting and Powder Metallurgy Show, Apr 24-26, Hotel Sheraton-Cleveland, Cleveland, Ohio.

American Institute of Mining, Metallurgical, & Petroleum Engineers—High-Temperature Materials Conference, Apr 26-27, Carter Hotel, Cleveland, Ohio.

National Screw Machine Products Association—Annual Meeting, Apr 29-May 3, Summerset Hotel, Boston, Mass.

American Foundrymen's Society—Castings Congress and Exposition, May 8-12, Brooks Hall and Civic Auditorium, San Francisco, Calif.

National Industrial Production Show of Canada -- May 8-12 Canadian National Exhibition Park, Toronto, Ont.

Material Handling Institute — Eastern States Show, May 9-11, Convention Hall, Philadelphia, Pa.

American Society of Mechanical Engineers — Production Engineering Conference, May 10-12, Royal York Hotel, Toronto, Ont.

American Institute of Industrial Engineers — National Conference and Convention, May 11-13, Sheraton-Cadillac, Detroit, Mich.

Machinery Dealers National Association — Annual Convention, May 15-18, Shoreham Hotel, Washington, DC.

American Society for Quality Control — Annual Convention, May 22-24, Sheraton Hotel, Philadelphia, Pa.

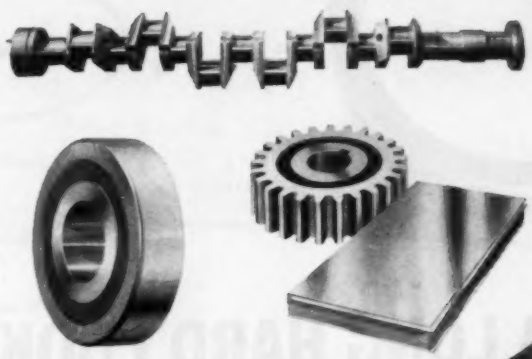
American Society of Tool & Manufacturing Engineers—Tool Show, May 22-26, Coliseum, New York, NY.

American Supply & Machinery Manufacturers Association — Triple Industrial Supply Convention, May 23-25, Atlantic City, NJ.

VALVOLINE

Tectyl

protects metals against RUST



There's a job for Valvoline Tectyl in your industry, protecting metal surfaces against rust and corrosion during shipping and storage.

Low-cost Tectyl rust preventives are widely used by the military services and by industry.

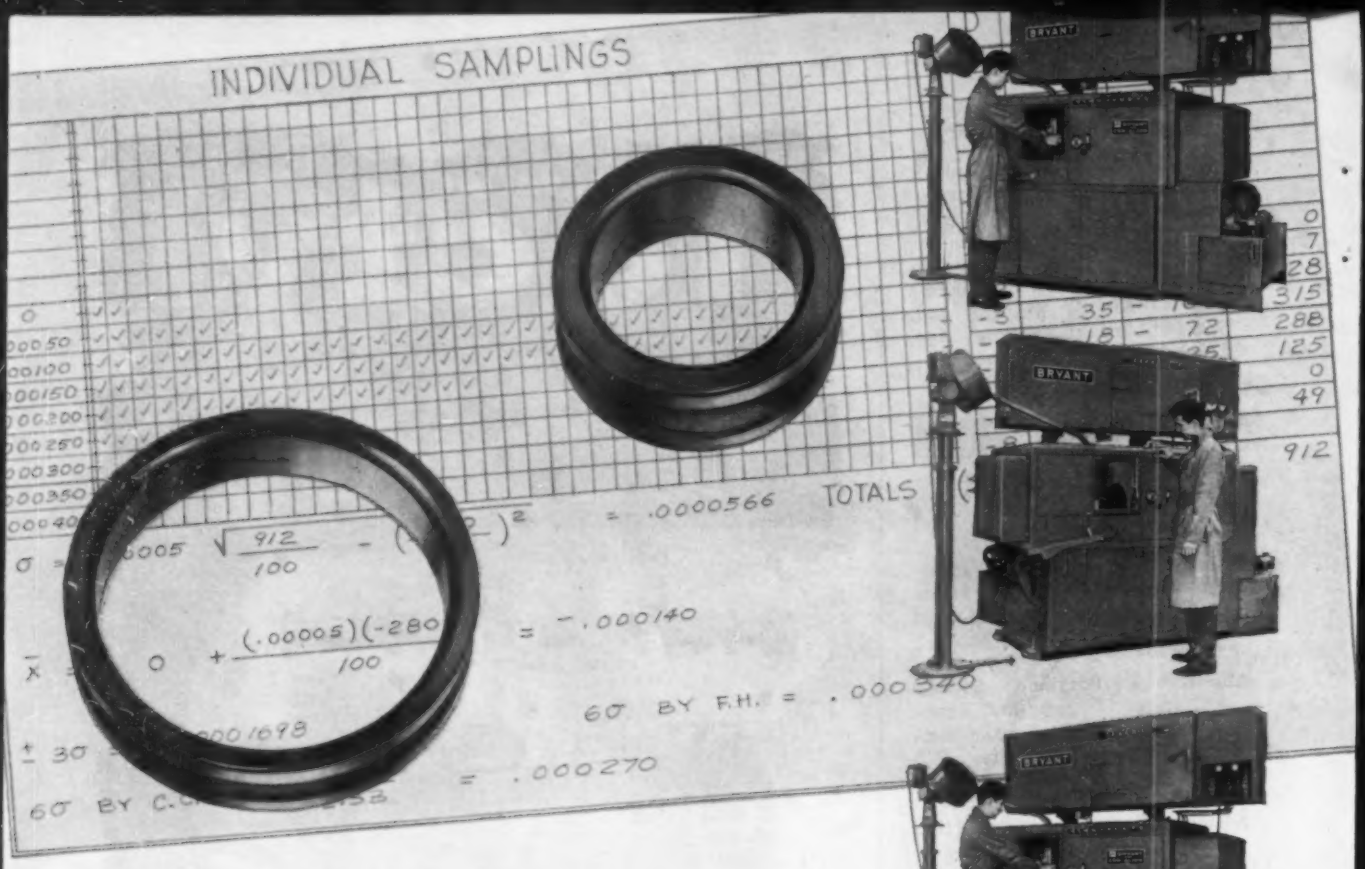
Tectyl's easy-to-apply, easy-to-remove film provides complete protection from the effects of snow, rain, salt air, humidity, perspiration and corrosive fumes.

Tectyl rust preventives meet exacting government specifications and there are more than 40 variations to meet every industrial need. *We suggest you write today for your copies of two helpful, detailed Tectyl charts, giving industrial and government specifications and applications.*

VALVOLINE Tectyl RUST PREVENTIVES

VALVOLINE OIL COMPANY, Division of Ashland Oil & Refining Company
Refinery — Petrolia, Pennsylvania • Home Office — Ashland, Kentucky

CIRCLE 238 READER SERVICE CARD



TAKE A LONG HARD LOOK AT GRINDER PERFORMANCE...

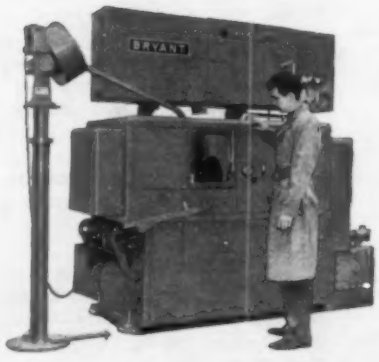
The Model "C" Centalign® is ideal for long run, high production grinding of straight bores, tapers, and bearing raceways.

Capability, reliability and durability — not initial cost alone — are the yardsticks to use in selecting a production internal grinder.

The frequency histogram illustrated above is just one of many capability tests used to prove out *all* Bryant production internal grinders. Tests such as this one (which tabulates the quality characteristics of workpieces ground) are your assurance of predictable, day-after-day production quality when you purchase a Bryant.

Precise engineering and a constant effort to maintain the highest degree of reliability in manufacturing result in solid durability. Proof: the many Bryant internal grinders operating with minimum attention and down time in all major production lines.

For full details on how Bryant internal grinders can improve your profit picture, consult your nearest Bryant or Ex-Cell-O sales representative.



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Chucking Grinder Co.

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Internal Grinders • Special Machinery

CIRCLE 239 READER SERVICE CARD

The Broadest Line of Industrial Filtration Equipment Offers over 4311 Filter Models and Media . . . . . .

For any filtration need — from Air to Zinc Cyanide — look to CFC Filters to improve product quality, cut maintenance and production costs, protect valuable equipment and reduce down time.

Fulflo Filters, for precise filtration of liquids and gases, have a choice of media that includes natural and synthetic fibers, pleated paper, sintered or woven metals and porous ceramics;

Honan-Crane Filters for industrial oils—with interchangeable pleated paper, cellulose fiber and fuller's earth media; **Delpark** Filters and Filter-Matics for continuous clarification of metal-working coolants and other industrial liquids — with paper, wire cloth, synthetic and natural woven fiber media;

Michiana Filters — with fiber media — for gas and diesel engine lubricating oils and fuels.

Write for catalog or engineering assistance to Department AM.

CFC

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

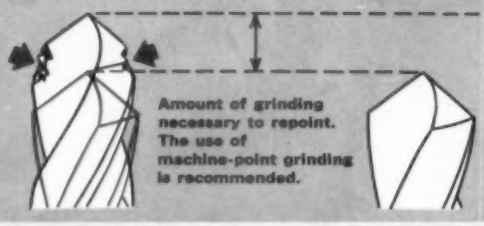
CIRCLE 240 READER SERVICE CARD

CIRCLE 241 READER SERVICE CARD ►

AMPCO
GREENFIELD

Facts about Drills and Drilling

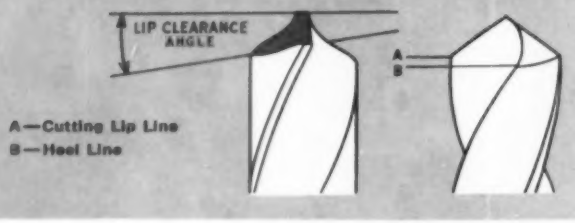
EXCESSIVE SPEED will cause wear at outer corners of drill. This permits fewer regrinds of drill due to amount of stock to be removed in reconditioning. Discoloration is warning sign of excessive speed.



EXCESSIVE FEED sets up abnormal end thrust which causes breakdown of chisel point and cutting lips. Failure induced by this cause will be broken or split drill.

EXCESSIVE CLEARANCE results in lack of support behind cutting edge with quick dulling and poor tool life despite initial free cutting action. Clearance angle behind cutting lip for general purposes is 8°-12°.

INSUFFICIENT CLEARANCE causes the drill to rub behind the cutting edge. It will make the drill work hard, generate heat and increase end thrust. Results in poor holes and drill breakage.



GREENFIELD TAP & DIE

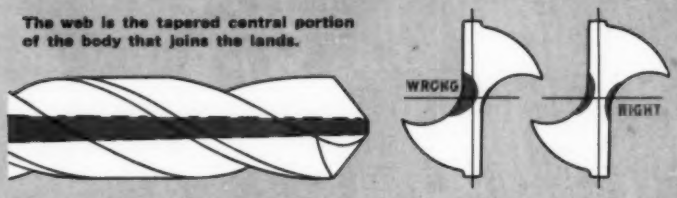
When you take a GREENFIELD-AMPCO Drill out of its original package you have in your hands one of the best drills money can buy. It is absolutely guaranteed against defective materials or workmanship. If it has been correctly selected for the job it is to do, and if used with ordinary care, it will give you entire satisfaction.

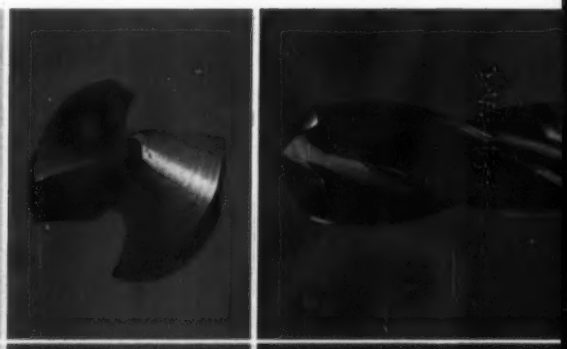
However, even the best of drills are subject to abuse, poor maintenance and unintentional mishandling of various sorts. This chart shows some of the more COMMON DRILLING FAULTS and how to prevent or correct them.

Our advice to Drill users is to start with top quality drills . . . like GREENFIELD-AMPCO . . . and treat them right. Then you will get all that you paid for . . . and more!

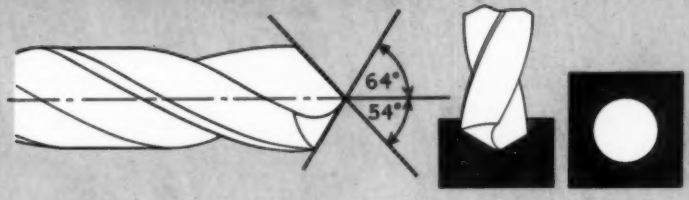
IMPROPER WEB THINNING is the result of taking more stock from one cutting edge than from the other, thereby destroying the concentricity of the web and outside diameter.

The web is the tapered central portion of the body that joins the lands.

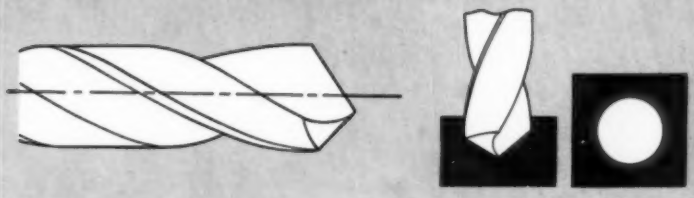




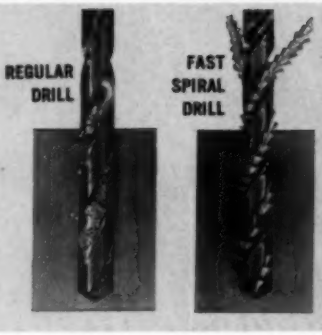
CUTTING LIPS WITH UNEQUAL ANGLES will cause one cutting edge to work harder than the other. This causes torsion strain, bell-mouth holes, rapid dulling, poor tool life.

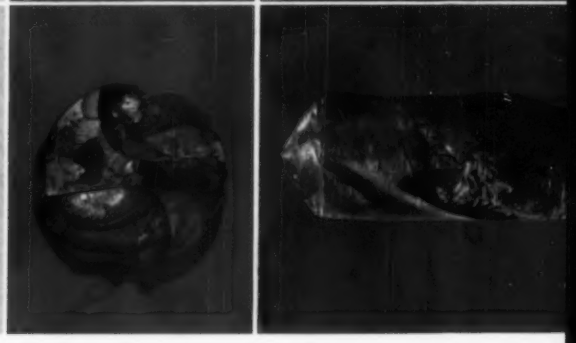


CUTTING LIPS UNEQUAL IN LENGTH cause chisel point to be off center with axis and will drill holes oversize by approximately twice the amount of eccentricity.



LOADING AND GALLING is caused by poor chip removal with insufficient dissipation of heat so that material anneals itself to the cutting edge and flute. This condition frequently results from using wrong drills for the job or inadequate cutting fluid application.



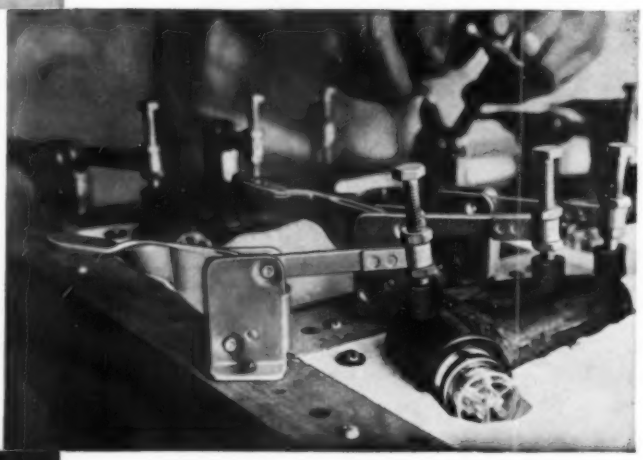


GREENFIELD, MASSACHUSETTS

Look what clamps are doing!

Practical uses of Wespo Toggle Clamps and Pliers that may suggest ways you can save

Toggle plier serves as low cost fixture for testing castings The air line is connected through one jaw of a Wespo Model 522 Toggle Plier. The plier is then clamped onto the casting and air applied by a foot control. Immersing the casting into a tank quickly spots any defects. Patented "Quick trigger" feature of the Model 522 instantly releases the casting; speeds testing. Rugged, lightweight Wespo toggle pliers are available in various jaw capacities and sizes.



Holding these glued parts together while drying is a simple task with Wespo Horizontal Bar-Type Toggle Clamps. Neoprene-capped spindles prevent damage to plastic surfaces, yet securely hold the parts during the drying operations. Wespo toggle clamps are available in more than 80 types and sizes. So, the next time you think clamps, think Wespo!

Simple, low cost "parking brake" for this track-operated frame is provided by a Wespo Push-Pull Clamp equipped with a neoprene-capped spindle. "Brake" is quickly applied or released by a simple flick of the wrist. Wespo Push-Pull Clamps are available in various sizes and holding pressures and are ordinarily used on holding fixtures where push or pull clamping is required.

FREE CLAMP CATALOG!
Ask your Wespo distributor for your free copy of this 16-page Wespo catalog. It will help you quickly select the right clamp for every clamping job.

WESPO

DIVISION OF VLIER ENGINEERING CORPORATION
26935 W. Seven Mile Rd., Detroit 19, Michigan
Formerly West Point Manufacturing Company

SPOT NEWS...

- **Explosively formed radar reflectors 78 in. in diameter and 22 in. deep** will be formed in a 35-ton ductile-iron die at Ryan Aerospace Division, San Diego. The die, largest ever used by Ryan for explosive forming, maintains tolerances of one or two thousandths on contour and dimensions of the parabolic aluminum mirrors. For news of *explosive welding*, see page 119.

- **Properties of refractory metals at temperatures above 2200 F** can be measured through use of electron-beam heating. Electrons from a hot tungsten electrode bombard the metal specimen, heating it to test temperature. Developed by Stauffer Metals Co, technique provides rapid heating, uses little power, apparently has no upper temperature limit, but must be done in vacuum.

- **Israeli-Scottish machine tool plant near Yazur, Israel,** has begun operations. Controlled on a 50-50 basis by Hamat Ltd of Israel and Scottish Machine Tools Corp of Glasgow, Simat Ltd (Scottish-Israeli Machine Tools Limited) represents an investment of about $600,000. Products will include press brakes, shears, hydraulic presses, and bending rolls.

- **Trend is from manual Tig to automatic Tig welding in jet-engine fabrication,** according to welding engineers at General Electric. Advantages: consistently higher quality, lower cost, lower heat input, less distortion. Mig welding may become important, but at present is handicapped by producing high crown welds with resultant notch effects, oxidation, and crater cracking.

- **Simulated die castings for test purposes are available to designers** and engineers through PDCS, Prototype Die Casting Service, a service offered by Newton-New Haven Co (New Haven, Conn). New casting method produces castings which "look, feel; and perform" like production die castings, eliminating necessity for investing in production tooling during design programs.

- **Effect of shearforming on mechanical properties of metals** is being studied by Temco Missile & Electronics Co under a contract from the Air Force's Air Research and Development Command. Typical effects include a slight increase in yield strength, and a decrease in ductility. Effect is believed to vary with amount of reduction.

- **Small-hole gun drilling of superalloys at General Electric,** Evendale, Ohio, brought out the surprising fact that carbide gun drills must be run at HSS speeds or they wear rapidly and the cutting edge fails. A possible explanation is that superalloys are extremely work-hardenable. Gun drills operate at very small feed rates, so the tips are constantly cutting into a work-hardened surface, with a resulting increase in heat.

- **Scottish trade unions are protesting alleged anti-union activity** by some American firms operating in Scotland. Claim is that companies refuse to recognize trade unionism and openly indulge in aggressive anti-trade union activities. Unions stress that most American firms have fine labor relations.

- **Air Force is concentrating its metals research on three temperature ranges:** —320 to 1200 F, tantalum alloys look promising; 1800-2000 F, new wrought nickel alloys show tensile strength of 50,000 psi at 1900 F; and 2000 F and above, here again tantalum alloys hold most promise. Present materials for the 1200-1800 F range are considered adequate.

- **Plasma-torch "machining" of refractory metals may cut production time** and problems in roughing cuts. Intense heat of torch plus high-speed jet action can slice through even the most refractory metals or can remove a thin layer from revolving parts with the torch set at a tangential position. Technique was developed by Linde Division of Union Carbide Corp.

CHECK YOUR GEAR NEEDS

- ☐ SPIRAL BEVEL GEARS
- ☐ HYPOID BEVEL GEARS
- ☐ STRAIGHT BEVEL GEARS
- ☐ SPUR GEARS
- ☐ HELICAL GEARS
- ☐ FLYWHEEL RING GEARS
- ☐ SPLINE SHAFTS
- ☐ GEAR ASSEMBLIES

and remember all **DOUBLE DIAMOND GEARS**

are built to produce low installed cost . . . to serve economically and dependably on the job for which you buy them . . . and to do credit to your product and reputation.

EATON

AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

WASHINGTON...

Kennedy overhauls defense plans . . .

The Kennedy administration's sweeping defense budget changes will have a massive impact on contractors. In revamping Eisenhower's spending plans for FY 1962, which begins July 1, the new administration substantially boosted the Polaris, Minuteman, and Skybolt missile projects; stepped up the Midas and other military space programs; and increased procurement and R&D for a wide range of conventional arms and equipment.

But on the other side of the ledger, the aircraft nuclear propulsion program was killed, B-70 bomber development was scaled down significantly, Titan ICBM production was reduced, and Eagle missile development was cancelled. In all, almost $500 million of new orders for next year were trimmed.

Kennedy also reaffirmed Eisenhower's refusal to authorize the start of production for the Western Electric-Douglas Aircraft Nike-Zeus anti-missile system. This is the third successive year the Army's plea to begin making long-lead-time Zeus components has been rejected.

New orders total $1 billion . . .

Net effect of the Pentagon budget overhaul is to add an extra $1 billion or so of procurement and R&D contract awards to Eisenhower's $19-billion program for next year.

Shipbuilding accounts for $400 million of the increase, notably for Polaris submarines. Polaris' schedule now calls for a fleet of 29 vessels by the end of 1964, 10 more than Eisenhower had planned.

Output of Minuteman ICBMs will be increased slightly, as the Air Force defers plans for three mobile railcar squadrons, but is authorized to build another fixed base which houses 60 extra missiles. ACF Industries and American Machine & Foundry are major subcontractors on the railcar project.

The Air Force is also authorized to double Minuteman production capacity. But the extra facilities—mostly "modification" of existing capacity rather than construction of new plants —will be kept on standby.

Other military increases . . .

The Air Force budget for Douglas-Aerojet's Skybolt air-launched ballistic missile is boosted to about $100 million, double the amount earmarked by Eisenhower.

To beef up limited-war capabilities, Kennedy tacks on $230 million to the Pentagon's appropriation request for procurement of helicopters, anti-submarine torpedoes, rifles, rocket launchers, ammunition, assorted small arms, and other equipment. Over $120 million more is sought for expanded research on such equipment as an off-the-road, floatable 1½-ton truck; electronic tactical command and control gear; portable missiles; and multi-purpose vehicles.

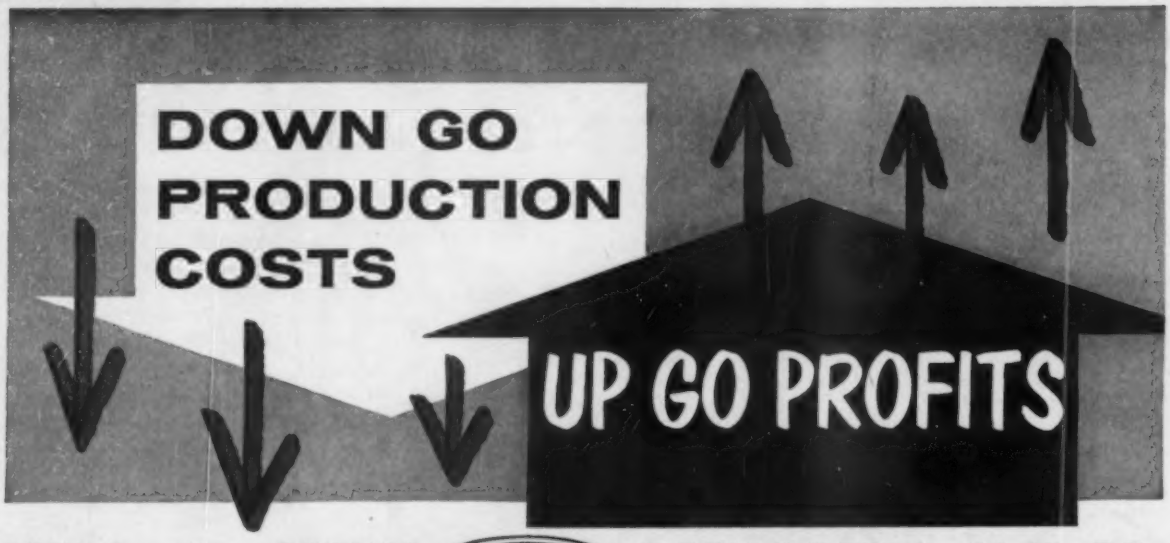
The new budget calls for $124.1 million more for the Navy to buy a new type of amphibious transport and for rehabilitating and modernizing the combat fleet. The Air Force gets extra funds to modify Republic Aviation's F-105 fighter-bomber—to carry heavier payloads of conventional bombs and to take off from shorter fields—and to start development of an advanced tactical fighter which can operate off naval carriers.

Craft vs industrial unions . . .

The feud between the AFL-CIO's craft and industrial unions over construction and maintenance work in factories is getting hot. Both sides are fighting hard for jobs diminished by unemployment. Employers are caught in the middle—in part because of new efforts to economize by shifting work practices. The issue has come to a head at AFL-CIO headquarters; it is involved in new decisions by the National Labor Relations Board. It is the subject of the Supreme Court's biggest labor case of the year, and it has broken up a joint pact between the two union groups on legislation now before Congress.

In a nutshell, this is what the fight is all about. Steel, auto, rubber and other industrial unions are demanding the right to maintenance and repair work in industrial plants. This is work they have often handled in the past and insist on keeping through no-contracting-out contracts with employers. The building-trades unions claim this is encroaching on their rightful craft work and are promoting "maintenance by construction" with contractor groups.

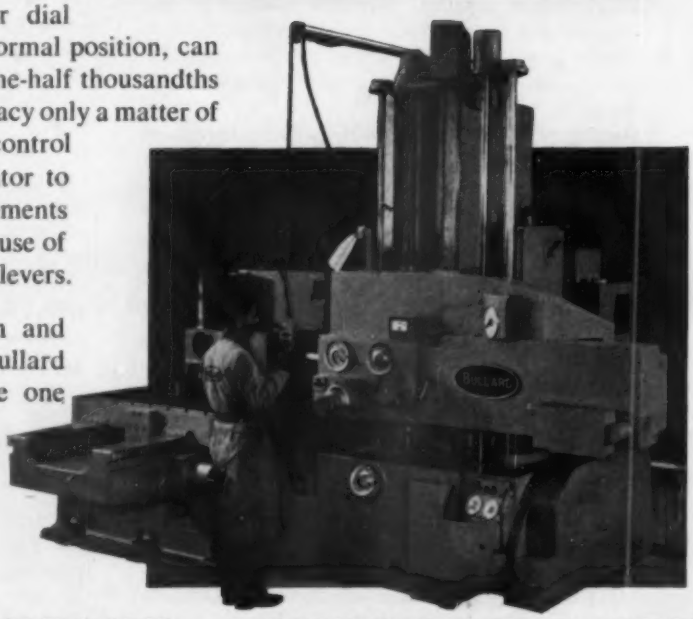
Here are the specific developments: A new NLRB decision holds as illegal a steelworkers' strike against an employer who decided to use subcontractors in maintenance work as an economy move. Walter Reuther's Industrial Union Department has withdrawn its support of the building-trades drive for legislation to permit picketing of construction projects, which kills its prospects. In the courts, the two unions are on opposite sides of test cases—just now coming to a head—over the right of construction groups to take over plant maintenance work. Instead of resolving the struggle, these tests are likely to lead to even greater bickering.



With the NEW BULLARD DYNAMILL H.B.M.

The controls, which have made it possible for Dynamill to reduce non-productive positioning time to a minimum, feature variable traverse rates recorded on large, clock-type dials, and controlled by Bullard's remote control pendant.

Head, table, saddle, and spindle each have a separate three-pointer dial which the operator, from his normal position, can easily read to an accuracy of one-half thousandths of an inch with further accuracy only a matter of simple interpolation. The remote control pendant allows the operator to traverse and position all elements under power without the use of handwheels, cranks or levers.



These and many other design and construction features of the Bullard Dynamill H.B.M. make it the one machine you

must investigate before buying any horizontal boring machine.

THE BULLARD COMPANY BRIDGEPORT 9, CONN.

DETROIT...

Production upped . . .

At long last, periodic factory shutdowns coupled to a rising daily sales rate have brought inventories of domestic new cars down to manageable proportions.

Field checks indicate 985,000 cars in dealer hands, a 60-day supply that could melt quickly should a true spring selling surge manifest itself. Inventory peaked in early February with 1,050,000 new cars stockpiled. This amounted to an 85-day supply at the then current rate of sale, and did not count a considerable number of leftover 1960 models.

The effect on production has been to boost the second-quarter target to 1,400,000 cars. Trucks, however, are barely holding their own with 97,000 scheduled for April completion. This is about 16,000 units under last April's performance. March total was 98,000, compared to 129,600 the previous March.

Sample optimism . . .

• "Dealer orders for the Dodge Lancer in the first 20 days of March were 80% higher than in the same period last month. . . . Orders for the Dart increased 76% and Polara orders were 116% higher."—Byron J Nichols, Dodge General Manager.

• **"Heavy-duty truck production** will be increased 18% effective March 27. . . . Daily production of the Scout will shortly be increased about 33% beyond our original plans."—W C Schumacher, International Harvester Executive VP.

• **"We have revised our schedules** for the second quarter to boost Rambler production 46% above the first quarter. 4000 employees will be recalled."—George Romney, AMC President.

• **"Solid evidence that our retail sales** of new cars may be ready for a rise comes from examination of recent trends in the daily rate of retail used-car sales. In October and November used cars were selling at a rate of 26,000 a day. In December that rate fell sharply to 23,000. But instead of following the downward trend of new car sales in January, used car sales snapped back up to 25,000 a day in January, and to 25,600 a day in February. This evidence is important to us because used car sales normally improve in advance of new car sales."—L L Colbert, Chrysler President.

• **"The March sales improvement this year** (34% above the January-February level) was nearly double the rise our dealers normally experience at this time of year."—James M Roche, General Motors VP.

Turbines in perspective . . .

Last month Chrysler announced a new 140-horsepower gas turbine (*AM/MM*—Mar 20, p103) that research organizations with $35,000 to spare could buy. Allison and Boeing for several years have made automotive turbines available to experimentally inclined truck and construction equipment operators. Ford will soon follow suit.

Within a few weeks progressive little Williams Research Co will announce a fantastic little turbine, about the size of an office wastebasket, that will turn out 104 shaft horsepower. A regenerative version of this is a loose fit under the hood of a Jeep.

Surprisingly, the pleasure boat industry is taking the lead in making turbines available to the private citizen. Kiekhaefer Corp and Boeing have banded together to produce the "Turbo-Mariner," a stern-drive gas-turbine unit with a current price tag of about $10,000. Target for mass production, however, is closer to $3000.

Ford and General Motors officials have made countless public statements indicating that they think turbines will find a place in heavy-duty trucking. The development of these companies is pointed in that direction.

But only 15,000 or so trucks in this weight category are produced each year and this is not mass production by auto industry standards.

Chrysler alone is aiming its turbine for passenger-car use, and George J Huebner, Jr, almost alone within the corporation thinks the day of usage may not be too far away. It would be a daring gamble, despite the fact that this turbine, according to Huebner's calculations, could be tooled for 1/6 to ½ the cost of an equivalent all-new reciprocating engine.

Economy dictates that the unit would have to featured in the volume car which, in Chrysler's case, is the Plymouth. What if it were not accepted by the public? It is not just a matter of switching back to a reciprocating engine. A turbine-powered car must be engineered and styled around its power plant to gain maximum efficiency in the new design. For example, no radiator is necessary, and the lighter weight would require redesigning of steering geometry and springing. And another point, a few gray iron foundries (or molten aluminum plants) would have to close. All things considered, it is a daring project that might scare itself to death.

—**Don MacDonald**

FINISH:

Reason enough to buy LeBlond

The glass industry is beginning to turn to mold plungers hard-surfaced with Colmonoy 6 to withstand the corrosion of molten glass. At 57-59 Rockwell C hardness, you don't machine such plungers on ordinary lathes—if you can machine them at all.

Yet Overmyer Mould Company of Winchester, Ind., turns Colmonoy coated plungers in 3 passes *to a 10 micro-inch finish.* That's more than fine enough to *use as-machined.*

Overmyer does it with 15" LeBlond Dual-Drive Lathes equipped with LeBlond tracers and constant surface speed control. From 1000 rpm at start of cut to 125 rpm at finish the Dual-Drives supply smooth, vibrationless power.

Rock-steadiness for turning rock-hard materials . . . Rigidity without excess weight or size . . . These are strong reasons to buy a lathe. They are reason enough to buy LeBlond.

LeBLOND of Cincinnati

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AIRCRAFT and MISSILES... TRENDS

GE hosts small businessman . . .

Small fabricators scattered throughout eight Midwestern states made a beeline for Chicago April 5. Purpose: to get a rundown on General Electric Co's 1961 jet engine subcontracting needs.

The prime lure for some 1500 small businessmen was a possible chance to bid in on $300 million worth of jet engine subcontracts GE plans to let in the eight Midwestern states this year.

This represents a stepup from the $250 million or so GE spent for the same purpose last year. The '61 figure of $300 million won't be appreciably affected by the Kennedy administration's revised defense program, a GE spokesman said.

In what was reportedly the largest small business procurement get-together ever, screw machine operators, sheet metal fabricators and a variety of other small manufacturers huddled with purchasing, materials, and manufacturing representatives of GE's Flight Propulsion Division. And they looked over some 700 jet parts on display.

It was a fortuitous occasion for everybody. GE was glad to spend an estimated $1500 or so to attract possible new suppliers from the thousands of small plants that dot the Midwest.

At the same time, the host city, Chicago, built up its potential for getting some more of the defense dollar (lack of defense work for the Windy City has lately been a sore point).

Not only that, Small Business Administration and the Air Force and Navy had a chance to discuss problems with a large group of potential suppliers in the small business category.

Said one GE official, "The great majority of small businesses don't really understand that they can compete for jet engine business."

They could get plenty of help along this line from the government, added Irving Maness, deputy SBA administrator, because the administration is concerned over the declining share of small business participation in military purchases of goods and services. Hence the SBA is "determined to increase the flow of governmental contracts to qualified small firms."

Air Force and Navy procurement specialists told the group that small businesses can frequently compete but they often just won't try.

For one thing, according to Admiral E F Metzger, small specialist companies can achieve tighter overhead control and thus a competitive advantage over bigger contracts.

"If a couple of good contractors come out of this meeting," he added, "it will react to Uncle Sam's favor." General Electric's experience with similar meetings in the past echoes that statement.

At a meeting in Toronto last May, for example, GE found a new supplier of inner rear cones (tear-drop shaped metal parts for afterburners) and realized a considerable cost saving.

Command performance . . .

"We are asking for aircraft that are simpler to maintain, with greater capacities, better performance, and a far greater ability to land and take off from very small, unimproved areas anywhere on earth.

"We require a much greater capability to operate our aircraft under conditions of severely restricted visibility, or in the dark of night.

"We must have air vehicles which are able to defend themselves by one means or another against hostile fire. We would like them to move much more quietly.

"We are asking a great deal, but we have every confidence that the challenge will be met"—*Secretary of the Army Elvis J Stahr, Jr, speaking at SAE's recent National Aeronautic Meeting.*

Cutback time in Texas?

Aircraft employment in the Dallas-Fort Worth area may soon get its biggest setback since the Eisenhower administration economy axe fell heavily on the area back in 1958.

This time it's the Kennedy administration doing the axing (if Congress approves the new administration-proposed budget), and this time it's only one plant—Convair-Fort Worth—that will feel the brunt of the cutback.

Convair had hoped to get an additional order for the B-58 Hustler bombers it had been building, now finds it isn't recommended in the new defense budget.

Worse still for Convair, the company had a contract to build airframes for nuclear aircraft, and now that's cancelled, too.

And to top it all off, Convair holds the contract to build the wing section for the B-70, and that program is slated for a 37% cutback.

Convair has been much luckier to date than such other Texas aircraft and missile makers as Ling-Temco Electronics and Chance Vought, has maintained employment at about 18,000 people for the last two years.

But those firms will be only mildly affected if changes in the new budget go through Congress, whereas not only Convair but its vendors and subcontractors will feel the pinch if projected cutbacks are approved.

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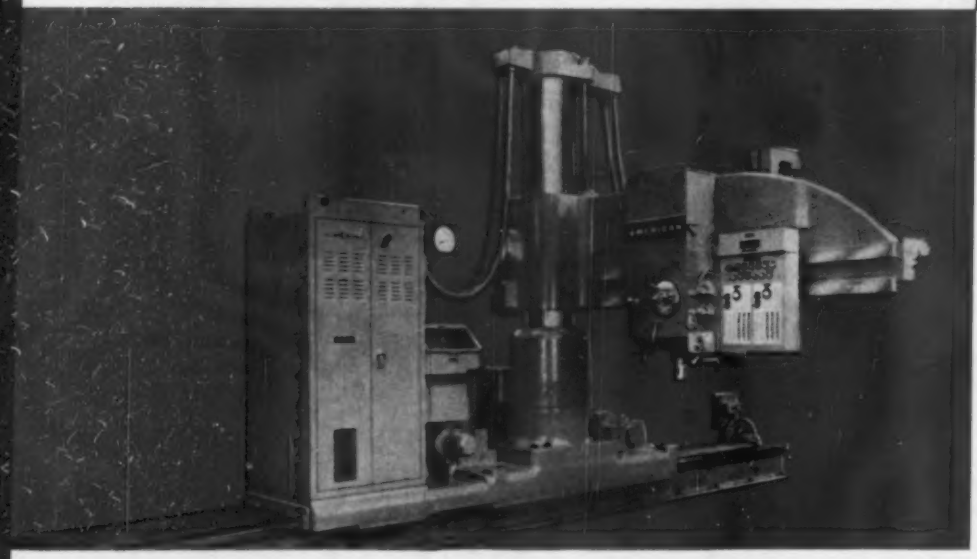

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MACHINE TOOLS...

Many builders report pickup . . .

"We are out of the woods and on our way again." That is the way in which a leading machine tool building company describes its recent volume of new orders.

Though many other builders would not subscribe to this burst of optimism, an increasing number report an improvement in incoming business.

One company selling general-purpose machines says that its current sales base is strong. Its March bookings were way up. Lots of its present quotations are for customers who are bidding on government contracts and who are finding out the cost of equipment for handling such contracts.

Another prominent builder reports first quarter sales substantially above last year's. Inquiries are very good, with the company confident that a good share will be converted into orders.

A sizable ratio of recent orders has come from automobile makers, especially from Chevrolet and Mack truck engine line programs. Buick is in the process of tooling for a new small engine.

Transfer machine builders are doing better. One has an 8-months' backlog with a few minor holes. Another's plant schedule is full for 10 months. A third's sales are up, order book is twice last year's volume and outlook is good.

Export orders still loom strong. One builder has received a big order for general-purpose machines from Japan. General Motors of Canada has a small buying program that may break soon. An important builder reports 40% of its 1961 business is from abroad and no letup is expected.

Navy is said to be about ready to buy a number of turret lathes, but intends to spread the business among several builders.

License rules spelled out . . .

An executive order may be out, presumably from the White House, before you read this page, spelling in detail the rules governing from now on the granting of shipping licenses for US machine tools which would be delivered behind the Iron Curtain.

The new order is an aftermath to the final decision denying to the Bryant Chucking Grinder Co the shipment of 45 internal grinders to Russia for which it already had an export license.

There will be little if any change in the procedure, it is said. When an application for a license is up for approval, every interested government agency will have a chance to voice its views in detail. The Defense Department will be heard in full, along with others.

But the Commerce Department will have the final authority. And once the decision is made to allow shipment, it will not be revoked, as in the Bryant case.

Export license, granted to the Cross Co for shipment of transfer machines for automotive work in Russia, has been revoked. But fortunately Cross had not yet got the order when the cancellation was made.

Norton Co, which had been negotiating for Soviet orders totaling around $5 million, is reported to have been denied a shipping license. Its automated machines were to be used in automotive production. Norton, it is believed, still hopes to get government approval of a license, despite its initial setback.

Russians hold out 10% . . .

At least one U S builder is understood to have taken a Russian order on the basis of payment of the final 10% of the price after the machines were installed and the Soviet plant management certified that they were running satisfactorily. A European builder is said to have taken a sizable order on these terms. It delivered its machines but has never been paid more than the 90%, the Russians claiming that the machines have not performed according to the builder's claims.

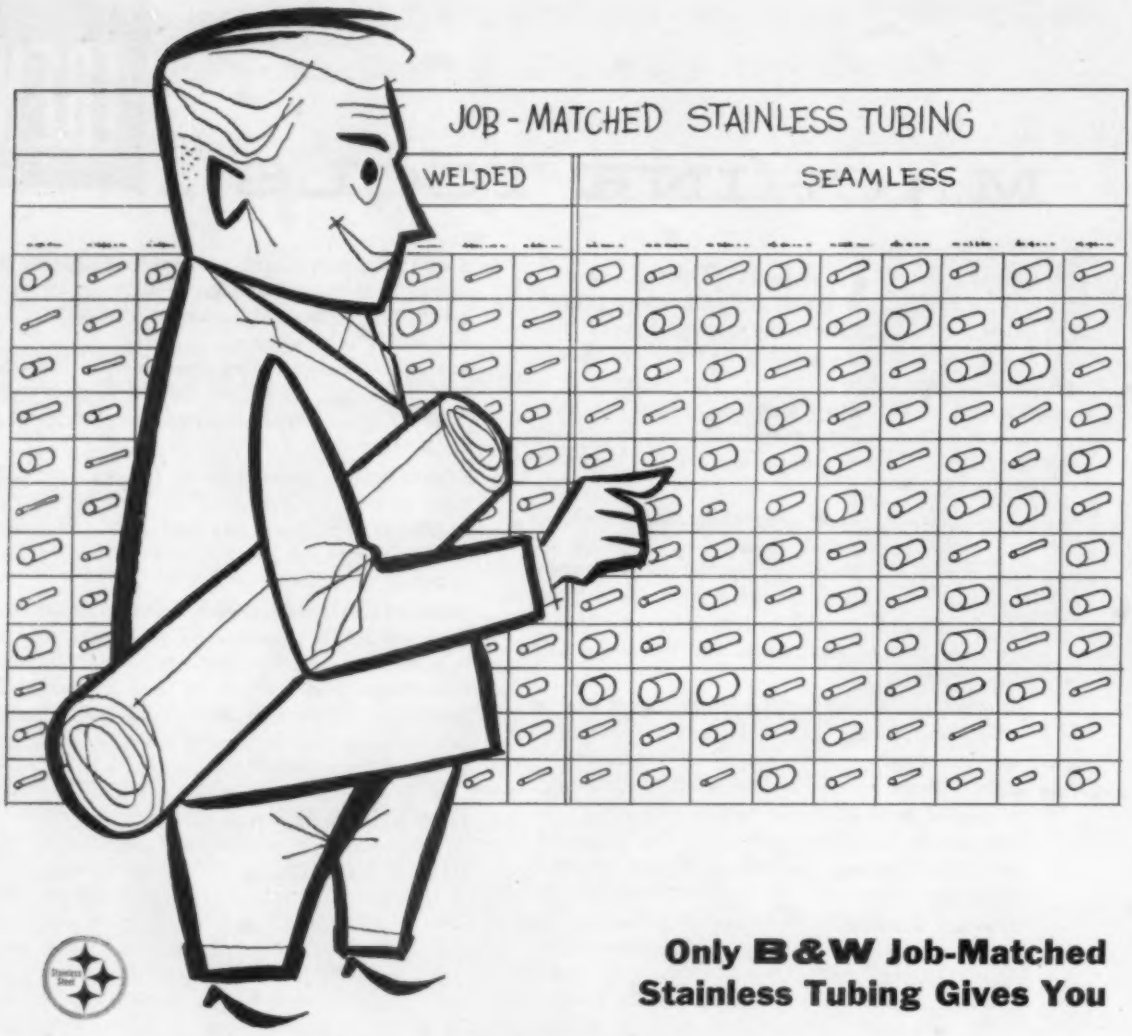
Navy selling elephant tools . . .

The Navy is in the process of selling as surplus 12 elephant gear hobbing machines. It has bids on all of them, but is asking for new bids on two because for them the bidding was so low that these machines probably would be used as scrap.

Government agencies concerned with mobilization resources are watching to see that all of these machines, after they get into private hands, stay in this country. The machines are bound to be scattered around the country and to be in use. Some government people feel that this is better than having all twelve bottled up in storage in one spot.

Strangely, some $8 million still is available to the services for purchase of the same kind of machines now being disposed of.

B.F.



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MATERIALS...

Bearings . . .

Molybdenum-disulphide filled nylon, called Nylatron GS, minimizes thrust bearing wear in a clutch-and-brake assembly manufactured by The Weiland Clutch Co, Cleveland. Filled nylon bearings have operated more than five years with virtually no wear. On 50 to 2500-ton presses, with only small quantities of lubricant, these bearings operated at pressure-velocity ratings of 300,000 while bronze bearings failed in 1½ to 2 years unless lubricated regularly. Weiland machines the bearings from disk stock manufactured by The Polymer Corp, Reading, Pa.

Requiring no lubrication whatsoever, a new type of bearing has been developed in Great Britain by Glacier Metal Co. It consists of lead and Teflon powders impregnated into a sintered bronze matrix on a steel backing. All American manufacturing rights are held by The Eaton Manufacturing Co, Cleveland.

Sound absorber . . .

Impregnating neoprene with lead powder seems to offer a long-sought answer to a serious sonar problem. US Navy engineers have discovered that applying this mixture to the inner side of the hull on vessels such as destroyers and submarines effectively minimizes sound effects from wave action and vibration.

Material is 70% lead powder by weight; mesh size or purity are not factors in the mixture. Only the damping characteristics of the lead are important. Sheets of leaded neoprene are adhesive bonded to the hull after the latter has been shot blasted. Technique requires about 12 tons of lead per vessel. Material also provides radiation shielding.

Compacting aluminum powder . . .

Density of compacts made from lamellar aluminum powder was increased from 0.45 to between 0.75 and 1.0 by a technique developed at the French AEC.

Fine, oxidized-aluminum powders are cold worked by passing them between two rolls drrven at slightly different speeds. Thus the particles are either sheared or deformed so that the oxide layer is fragmented. By compacting the treated powder immediately, the exposed metal surfaces will cold-weld.

Stainless aircraft studied . . .

Believed to contain the largest quantity and variety of stainless steel ever used in a single aircraft design, the experimental British Bristol T-188 includes stainless sheet, bar, forgings fasteners, and tubing. Alloys include the "300 series," 321, 403, and 420. Structure, built at Bristol Aircraft Ltd's Filton Works, Bristol, England, is welded. The single-seat, mid-wing monoplane with twin, wing-nacelle mounted power plants is built to operate at above 1500 mph. Skin temperature at cruising speed is normally 450 F.

Stainless-steel keel boom is forged and machined from a single piece of type-403 rolled barstock 39 ft long. Original cross-section of 4 by 3⅛ in. was reduced to flanged thicknesses varying from 0.1 to 0.45 in. At a final length slightly under 27 ft, the boom was hardened and tempered by resistance heating in a special tunnel furnace, with hydraulic loading of the part to hold straightness.

Solid type-403 rivets, machined from barstock, were developed and "performed very well in the fully hardened and tempered condition at 75 to 80 tons psi." These rivets set with relative ease, by squeeze or percussion, in size up to 3/16 in. diameter.

First came "Pioneer I" and "Sea Bird," stainless aircraft of the 1930's. After WW II were the X-2 research craft and the B-58 "Hustler" with skins of stainless. Today's contribution includes the X-15 rocket plane, the controversial B-70 long-range bomber, and the Bristol T-188. The next generation of commercial aircraft is expected to rely heavily on stainless steel.

New "superstrength" steel . . .

A superstrength steel that permits design of truck tanks 32% lighter in weight than when fabricated from high-strength steels now generally specified has been developed by Great Lakes Steel Div, National Steel Corp. Detroit headquartered GLS is moving into the fast growing pressure vessel highway transport and point-of-use storage field with the new alloy. Only one other company offers the superstrength-rated, approved pressure-vessel steel. Export markets also are anticipated.

Minimum tensile strength of the alloy is 115,000 to 135,000 psi; minimum yield strength is 100,000 psi; maximum (under ASME code) design stress is 28,750 psi. The material is said to have toughness at low temperatures, good strength at elevated temperatures, and excellent weldability under constrained conditions.

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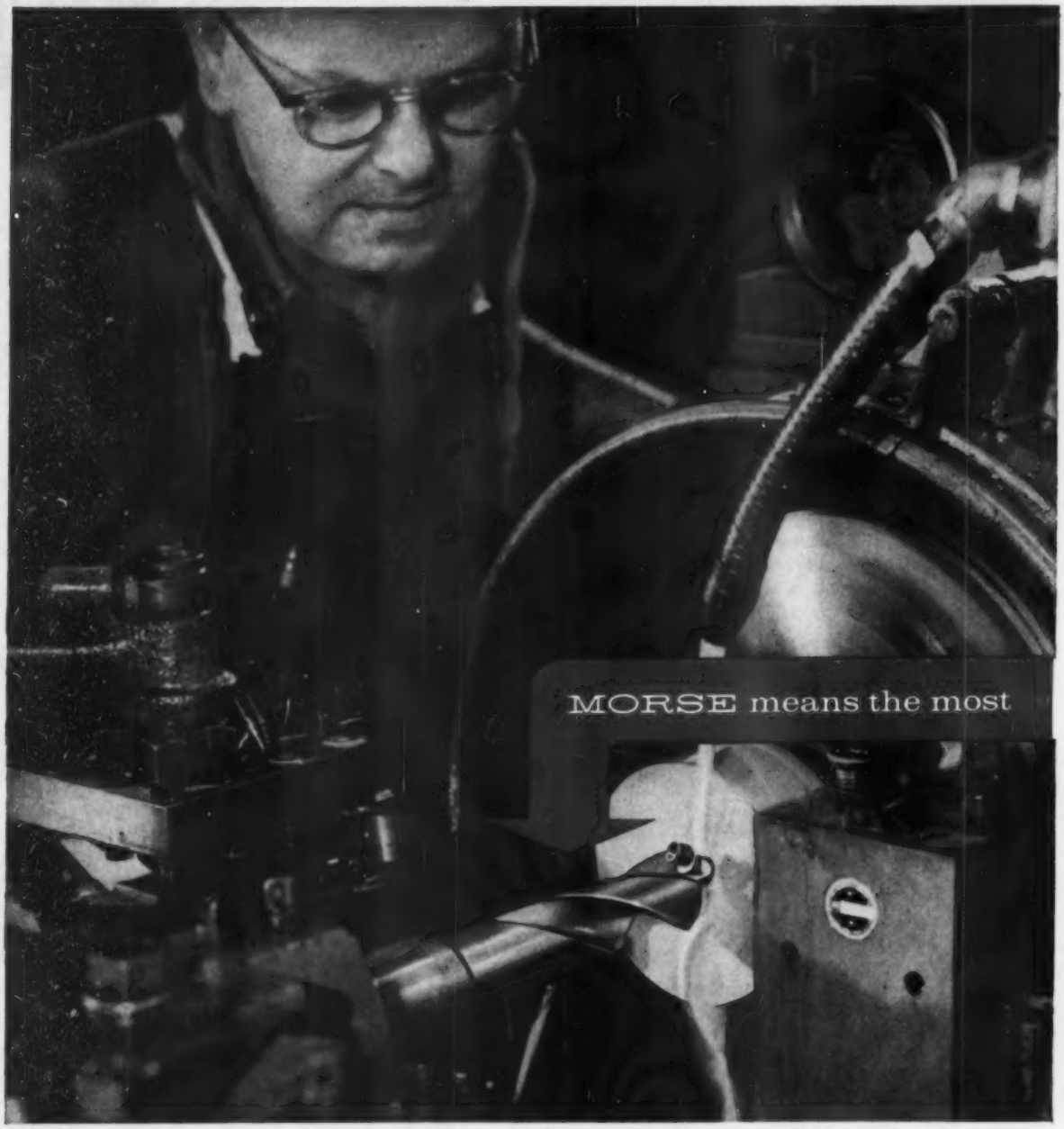

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WHAT'S AHEAD... in Metalworking

TRENDS

More signs of cautious optimism . . .

Though there seems to be little but sideward movement in the metalworking industry at the moment, more and more segments of the industry are voicing the opinion that the worst is over. Activity is still slow, but inquiries are coming in at a better rate now than they have in quite some time.

Steel producers report continued small gains in production. The gains seem attributable to increased orders from a wide range of "miscellaneous" smaller industries, with little or no help from automotive companies. Construction orders have not yet started to come in sizably, and this delay could cause a giant step forward if and when these orders begin to flow in.

Tool and die makers have tempered their optimism somewhat now that the B-70 program is about to be cut back once again. June should bring the end of most work now in the hands of contract tool and die shops, and there doesn't seem to be anything between then and the end of the year unless some work on '63 model cars breaks by then.

Electronics, always a bright spot, continues to rise. Strongest area appears to be the West Coast, where electronics sales have generally followed their 20%-a-year upward curve undisturbed.

Sales of farm machinery are up about 5 to 10% over the same time last year, and some companies are calling back employees and increasing production. One company has even put on Saturday work—for the first time in years.

Screw machine parts manufacturers report little change in business. The NSMPA says that its members are operating at about 160 on the Association's index (1947-49=100), with little indication of a pickup in sight. Backlog in the industry has been reduced substantially because of low operating rates.

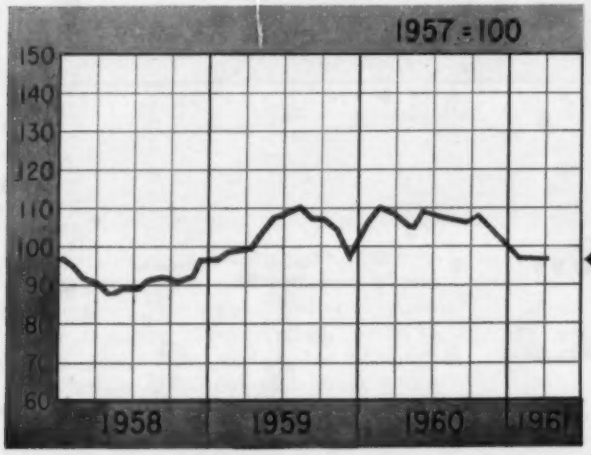
Manufacturers of cutting tools are worried over the dwindling backlog of orders. One spokesman said that his company had been predicting a good second quarter, but now it's not so sure. "The orders just don't seem to be there," he said.

The American Gear Manufacturers Association reports that the latest monthly booking index dropped about 1%. The index now stands at 218.3 (1947-49=100). There has been little change in the booking index in the past six or seven months.

Welding shops have noted some quickening in the number of inquiries in recent weeks. Though these have not yet been translated into orders, most operators feel the level of inquiries is encouraging and that the business will come in.

The bearing business is still slow, and employment in the industry is down. Reduced work weeks are the order for one major producer, but hopes for a general improvement are still voiced. No one sees any real reason for the optimism, but continued reports of a "bottoming out" of the recession seem to be contagious.

Small and fhp electrical motor manufacturers present a rather cloudy picture. No one is moaning, but no one is particularly pleased either.

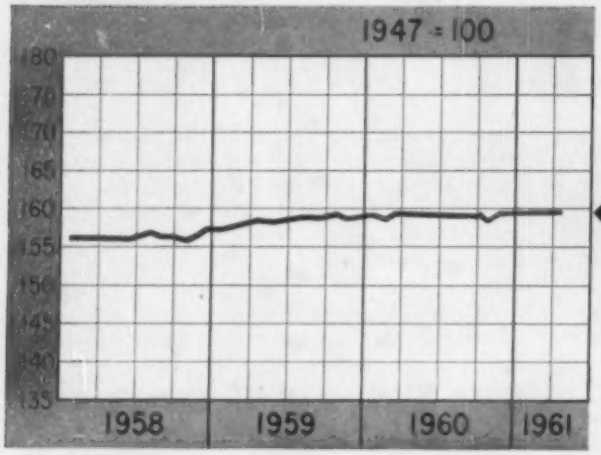


AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAR Estimated	FEB Preliminary	JAN Revised	MAR Year Ago
Total Index	**97**	**97**	**97**	**108**
Machinery	**95**	**95**		**104**
Electrical Machinery	**110**	**109**		**115**
Autos	**85**	**88**		**126**
Other Transportation	**89**	**89**		**88**
Other Metalworking	**102**	**103**		**111**

TRENDS WHAT'S AHEAD... in Business



AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	MAR Estimated	FEB Preliminary	JAN Revised	MAR Year Ago
Total Index	**159.4**	**159.5**	**159.6**	**159.7**
Metalworking Machinery	**195.0**	**195.0**		**189.7**
Other Machinery exec. Electrical	**173.8**	**173.7**		**172.8**
Electrical Machinery	**158.6**	**158.7**		**162.4**
Fabricated Metal Products	**147.1**	**147.3**		**148.0**

Business recovery in the making . . .

The mildest business recession in recent history has run its course, and a new economic upswing is in the making. As a result, 1961 will turn out to be another year of record business volume, with each approaching three-month period surpassing its predecessor in volume of goods and services produced.

Durable goods industries will, of course, reflect this generally improving business outlook. The steel industry has already edged up its operating rate from last winter's lows. And it is likely to gain further in the months ahead. Similarly, the auto industry has seen its sales and output edge upward with the end of harsh winter weather in many areas of the country.

Other durable goods industries are likely to get a boost as some of the Kennedy administration's proposals are translated into action. Farm machinery makers, for example, are likely to share with farmers the benefits of higher government support prices for key products such as feed grains. And hard goods industries that slipped as a result of previous cutbacks on conventional fighting forces will get a lift from efforts to beef-up US capabilities for brush-fire warfare.

But consumers, too, are likely to be adding to their durable goods purchases. Partially, their outlays will grow as a result of rising incomes. But in addition, they are managing to pay off some of their instalment debts. Freed of outstanding debts, they will be able to make outlays for other goods they desire.

Still, there won't be a real surge of durable goods buying by consumers or business. And because of a poor start, some industries—notably autos and steel—may turn in a poorer showing for the year as a whole than they did in 1960. But with general business activity on the rise, prospects for durable goods, too, are improving. And with a solid selling effort, durable goods industries can recoup some of the setbacks suffered early this year.

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Business Week Index of Activity (1947-49=100)*	141.7	141.2	153.4
Steel ingot production (thousand tons)	1,632	1,611	2,527
Electric power output (million Kilowatt hours)	14,163	14,519	13,900
Production of automobiles	101,902	87,808	147,830
Engineering construction awards (*Eng. News-Record*, thousands)	65,891	62,780	65,315

MONTHLY BUSINESS INDICATORS	*Latest Month*	*Preceding Month*	*Year Ago*
Vacuum cleaners sales (thousands of units)	226	253	267
Refrigerators sales (thousands of units)	242	254	258
Washers sales (thousands of units)	187	223	203
Household electric ranges sales (thousands of units)	71	62	67
Radio production (thousands of units)	668	866	723
Television production (thousands of units)	361	368	526
Gear sales index (1947-49=100)	220.8	216.5	243.4
Foundry equipment new orders index (shipments, 1947-49=100)	123.7	101.2	95.5

* Seasonally adjusted

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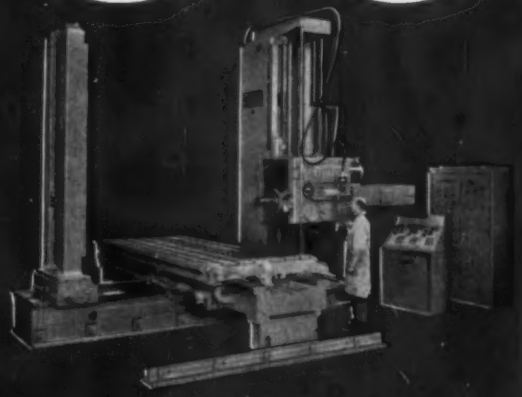

14

reasons to consider tape-controlled Gilberts

Summarized here are the main reasons you should consider Cincinnati Gilbert's numerically-controlled 4" and 5" horizontal boring mills. We suggest a letter or phone call for complete information—or, better yet, a visit to the plant to see an actual demonstration. The Cincinnati Gilbert Machine Tool Co., 3366 Beekman Street, phone KIrby 1-4815, Cincinnati 23, Ohio.

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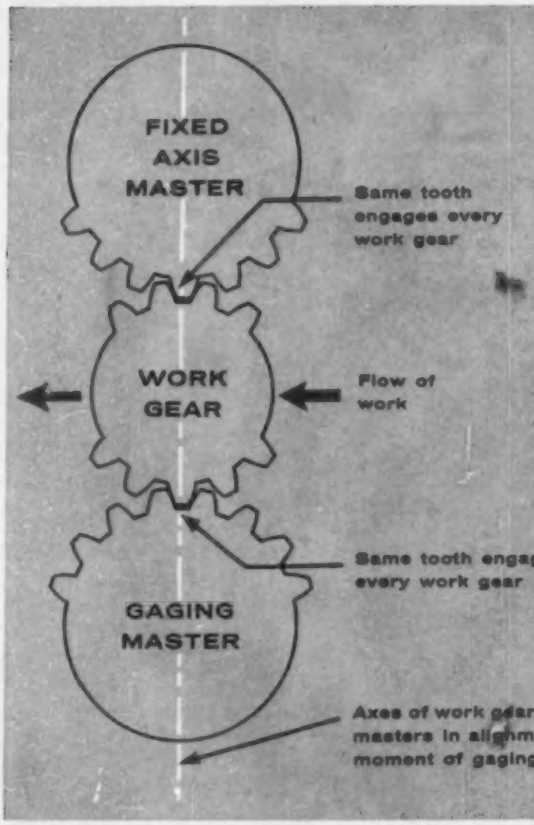
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Leaf From the Red Book

The President has asked for more money for conventional types of weapons—1961 style.

This is a commendable move. It indicates an awareness of the dangers of concentrating on the massive-retaliation concept to the exclusion of everything else.

Just where are we likely to run into trouble? We had it, far more than we wanted, in Korea. We may have it in the Congo. Right now it is a big threat in Laos.

Should we get involved in fighting in Africa and southeast Asia, or in other remote regions, it would be a so-called limited war of the nastiest kind. And it would be fought by men armed with up-to-date conventional weapons.

So we are sensibly edging away from the Thirty-Minutes-War idea, always mindful that we must have at our beck and call powerful nuclear deterrents. We are getting down to the kind of thing that the Communists know and respect.

The Kremlin leaders . . .

are shrewd about a lot of things. They recognize that along with an adequate supply of weapons goes a large, modern and efficient industrial plant. One is not possible without the other.

Beyond that, they are constantly conscious of the basic truth that if they do not have such an industrial plant, their economy cannot hope to grow at the Kremlin's boasted projected rate.

The Soviet bosses thus are mindful of the necessity for building large numbers of new machine tools to equip their burgeoning industrial facilities. So the Kremlin has assigned the highest priority to new machine tools. No other government in peacetime has ever accorded machine tool production such high ranking in the scheme of things.

It is a sound concept. We would be stronger if we adopted it as our own. The President is pushing hard to increase our annual rate of economic growth to insure the nation's prosperity. He also wishes to be prepared for limited as well as all-out warfare.

But as long as . . .

we seem content with an obsolete, inefficient, high-cost industrial plant, such as we now have, the President's laudable objectives will be difficult to realize.

No one in America, not even the President, has the Kremlin's power to legislate by decree. Still, much can be done to carry out with the least delay Mr. Kennedy's praiseworthy objectives to strengthen our peacetime economy and our wartime potential.

Washington should take the initiative by creating the kind of favorable climate in which industry can modernize and expand. First and foremost of its actions should be to enact tax legislation that will sharply increase private investment in capital goods embodying today's (rather than yesterday's) technology.

Such legislation should contain a strong stimulant or it will be ineffectual. "We should not use aspirin where a wonder drug is called for," is the way the Machinery and Allied Products Institute puts it.

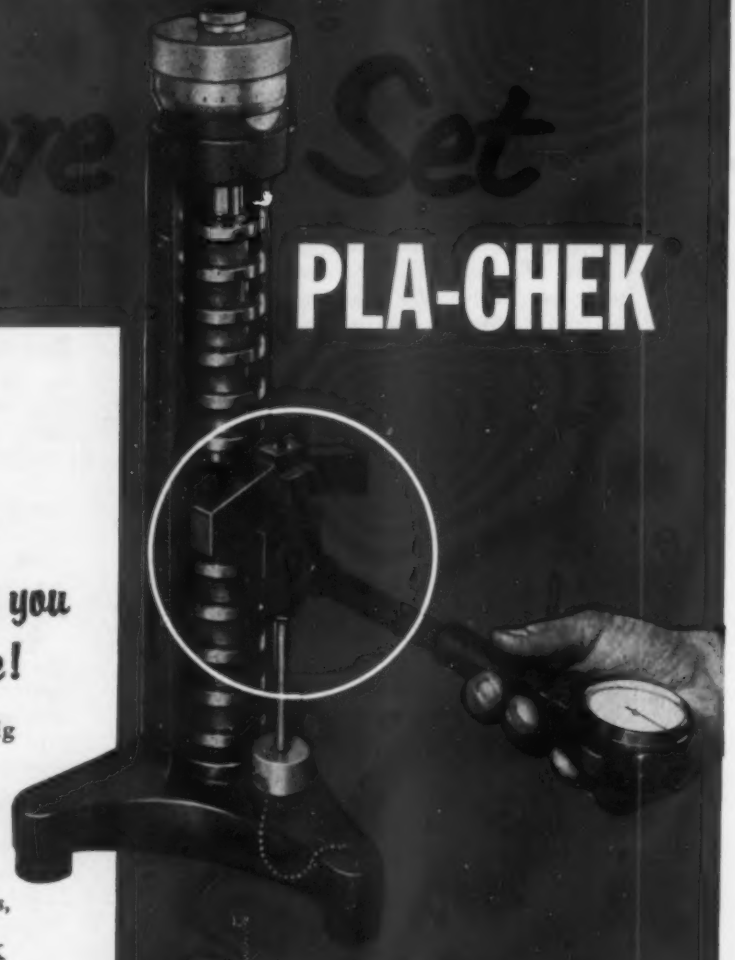
Government action . . .

will not be enough, however. A heavy responsibility will rest on industry to do its part. For its own best interests will be at stake. It then should replace old equipment with new and thereby lower its costs, enhance the quality of its products and be in a stronger competitive position.

Soviet Russia maps its programs on the premise that a young industrial plant is its best resource in peace and in war. We should do likewise.

Burnham Finney EDITOR

with this NEW Cadillac Bore Set PLA-CHEK



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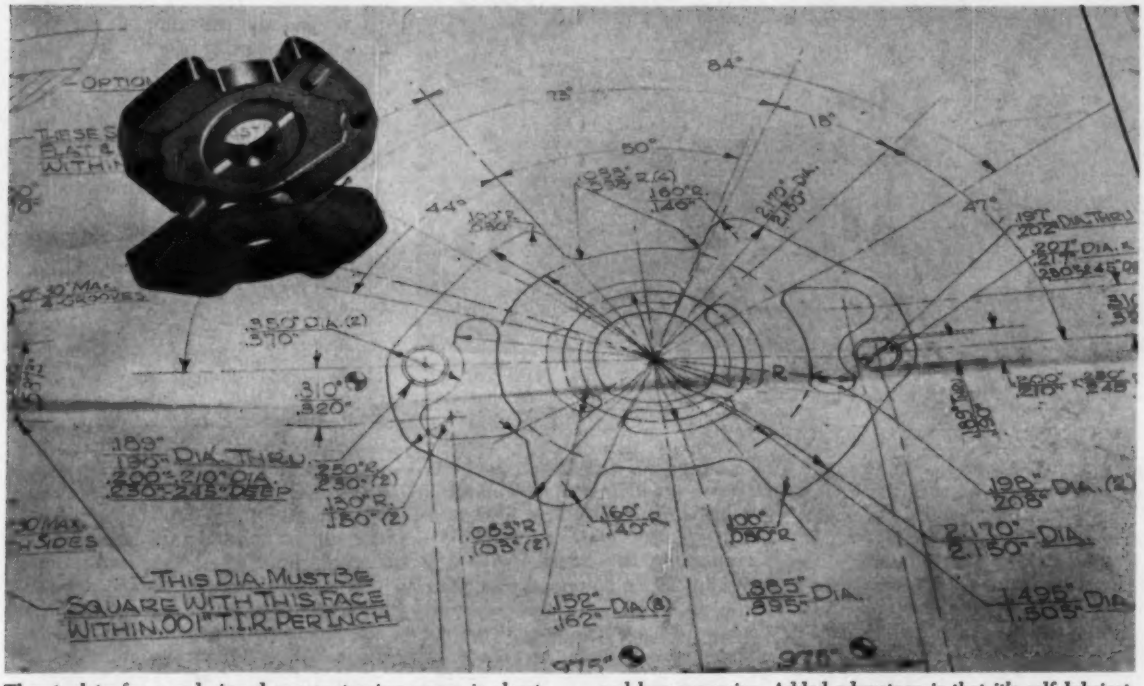


Thrust plate for a redesigned power-steering pump is about half the size of the CI plate it replaces, but is harder, stronger, and less expensive. Added advantage is that it's self lubricating, which eliminates scoring, previously a serious problem

Redesigning for powder parts

Switchover from casting of power steering pumps to powdered metal has cut down on imperfections, improved performance, and reduced manufacturing cost

By Richard B Thompson,
United States Graphite Co,
Division of the Wickes Corp,
Saginaw, Mich

Redesign of a high-pressure pump for an automotive power steering system has fulfilled three primary objectives: quality and performance of the part have increased, its size has been reduced, and it costs less to make.

Not only that, scoring which took place when the part was made as a casting, has been eliminated. In fact, savings in raw material alone have paid the cost of tooling up the part for powder metallurgy — and in a short time.

Pump thrust plates (see photo above) are now made from Grade 361 Gramix Iron, steam treated to increase hardness, compressive strength and wear resistance. The end result: thinner sections and a smaller overall size, about half that of the cast iron plates previously used. The powder metallurgy part is self-lubricating, eliminating scoring, which was a serious problem when the part was made from cast iron.

Close tolerances are consistently maintained on the thrust plates, and this cuts down considerably on the amount of machining required. For example, the bore is molded to a diameter between 0.5870 and 0.5875 in., and no machining of this surface is necessary.

Self-lubricating

The inherent self-lubricating properties of the burnished bore make it an ideal bearing surface, and eliminate the need for a costly bronze bushing and a special lubricating system.

And powder metallurgy holds dimensions of other components to close tolerances — dowel pin holes

Compacting press exerts 60,000 psi to form Gramix Iron powder, grade 361, into thrust-plate shape. Bore is molded to 0.5870-0.5875-in. and requires no machining

and ports, for example. In fact, the only machining required is grinding of the plates to specified thickness and flatness.

Previously, cast iron plates had to be finish-machined to control size, and holes had to be drilled before grinding. Now, the reduction in machining operations alone has eliminated the need for much costly capital equipment. And scrap is virtually a thing of the past.

When the thrust plates were made as castings, blowholes and gas pockets were frequently discovered after expensive machining had been done.

Compacting the parts

Production of pump thrust plates starts with extremely fine iron powders, which are compacted in a mechanical press. When the die cavity has been filled with loose powder, the powder is subjected to a pressure of 60,000 psi.

Ejected from the die, the parts (briquettes) are brittle but have sufficient strength to withstand handling. They are carefully moved in special containers to the controlled-atmosphere furnace, where they are heated to about 2000 F. This sinters and bonds the metal powder particles.

Because atmosphere can be controlled precisely in modern furnaces, it is possible to regulate the combined carbon and microstructure of the ferrous parts so as to produce a stable, durable, fine-grain pearlitic structure which is both wear and shock resistant.

There is no decarburization, no soft and hard spots on the parts. And sintering procedures have today reached the point where these physical properties can be obtained consistently:

Density (dry)—6 grams per cc, radial crushing strength—37,000 psi, tensile strength — 18,000 psi, yield point (in compression) — 12,500 psi (0.1% offset), elongation—1.5%, and modulus of elasticity—14-million psi. (Note: these are average values obtained from test bars and should be used only for guidance in design).

Because of the close tolerances specified for the pump thrust plates, the sintered parts are sized in a coining die. Extremely accurate and with an ultra-smooth finish, this die permits consistent holding of bore size and other close-tolerance dimensions. And complex configurations of ports and other surfaces can be faithfully reproduced.

Powder metallurgy parts are subjected to magnetic particle inspection

Magnaflux inspection checks for cracks and inclusions after parts are furnace sintered. Part is placed in electromagnetic coil (right) while iron-oxide particles suspended in kerosene are squirted over the part. Ultraviolet lamp shows up flaws

Phosphate coating is applied by Parco Lubrite chemical treatment by dipping parts for 15 minutes in a 10% solution of iron and manganese phosphate, then rinsing in hot water for one minute, and dipping in water-soluble oil for a minute

to make sure that they have no surface or near-surface imperfections, such as cracks, inclusions, or other discontinuities. This is the Magnaflux method, in which iron-oxide particles suspended in kerosene are flowed over the magnetized thrust plates, showing up any discontinuities in the parts.

Steam treatment imparts higher hardness, increased compressive strength, and greater wear resistance to the pump thrust plates. This is done in a Leeds & Northrup electrically heated, forced-convection Homo furnace.

Parts are placed in wire baskets and lowered into the furnace, which has been preheated to 1100 F with an air atmosphere. Superheated steam, at 60 psi, is introduced at the bottom of the furnace, then passes up over electrical heating elements and is pulled down through the work basket by a fan. Steam exhausts at low pressure through a flapper valve in the furnace lid.

The parts are soaked at 1100 F for one hour, are then removed from the furnace and cooled in air.

As a result of this steam treating, a layer of magnetic oxide forms wherever steam contacts the material—not only on the outer surfaces but on all surfaces of the interconnecting pores. With this hard, durable coating the pump thrust plates achieve a hardness of Rh 70 B.

Even after surface oxide is removed from the thrust plate faces in subsequent grinding operations, the porosity of the parts and the oxide penetration combine to produce hard, wear-resistant surfaces.

Faces of the plates are ground flat, parallel, and to required part thickness on a Gardner double-disk grinder. Back face is held flat to 0.0002 in. and square with bore within 0.001 in. per in., tir.

Parallelism of the two faces is held to 0.004 in., and the thickness of the parts is maintained between 0.335 and 0.345 in.

The plates are then given a coating of iron and manganese phosphate so as to prevent galling, scuffing or scoring when the rotor-and-vane assembly contacts the back face of the thrust plate during pump break-in.

This is done with Parco Lubrite chemical treatment, which produces a nonmetallic, oil-absorbent iron and manganese phosphate coating in hard, crystalline form. This not only improves wear resistance but facilitates break-in by retaining lubricant and preventing metal-to-metal contact.

Cleaned parts are first immersed for 15 minutes in a 10% aqueous solution of Parco Lubrite, followed by a one-minute hot water rinse, and then a dip in water-soluble oil for one minute. •

Plasma torch learns to weld

"Everyone is agreed that the plasma-arc torch is a potential welding tool." (*AM*—Oct 19 '59, p125)

No longer "potential," the plasma torch is now a practical welding tool, according to the Linde Co Division of Union Carbide Corp. The company is introducing Plasmarc welding and weld surfacing at the AWS Welding Show in New York this week and will demonstrate the weld surfacing operation.

The process can be described as an advanced form of Tig welding. There's a welding torch with a tungsten electrode. There's also a flow of inert gas through the torch, and the arc is struck between the tungsten electrode and the work, just as in Tig welding.

Nozzle marks difference

The main difference is that the arc and the inert gas pass through a constricted orifice that's designed so the arc puts the greatest possible heat into the gas. In doing so, it turns the bulk of the gas into plasma at temperatures of 10,000 F and up.

Since a plasma is an ionized gas, composed of free electrons and negatively charged ions, it responds to the magnetic field of the arc. Therefore, it forms a true cylinder around the arc, from the torch to the work, instead of spreading out into the conical shape typical of conventional gas-shielded welding.

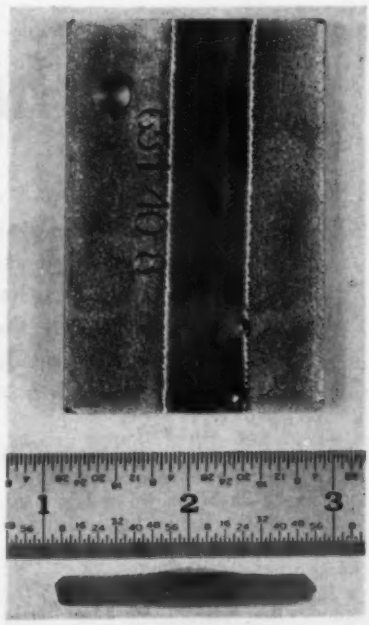
This cylinder of plasma forms a much better path for the arc, as was proved by an extreme test made at Linde's laboratories. When the arc length was increased by ½ in., the voltage across the arc increased only 3 v—from 26 v to 29 v. With a Tig welder, such an increase in arc length would kill the arc; there wouldn't be enough voltage to make the arc jump the gap.

Because of the better path, then, the arc is very stable, and variations in arc length have little effect on weld dimensions. Penetration is uniform, and depth-to-width ratio is higher than in Tig welding.

Surfacing with the Plasmarc torch is called weld surfacing, and Linde says it produces a fully fused deposit in one operation. Dilution of the deposit can be controlled from 5% to 50%.

Powdered metal filler

Filler metal is added by feeding a metered flow of powdered metal into the torch. The inert gas carries it to the work and also shields the weld area. Successful deposits have been made with nickel, copper and cobalt-base alloys, stainless steel, chrome-carbide-containing materials, and heterogeneous materials such as tungsten carbide particles in a steel base.



Type 304 stainless was deposited on mild steel with current of 110 amps, argon flow of 50 cfh, and 8-ipm torch travel

Power needs for either welding or weld surfacing can be handled by a 300-amp rectifier unit, plus a 50- to 100-amp supply for the pilot arc. •

RUSSIA'S INDUSTRIAL COMPLEX

How big is it?

Based on unclassified U S and Soviet sources, here is a unique analysis of Russia's vaunted new industrial might, classified by industry. As yet incomplete (it is a continuing project undertaken as a hobby by a U S engineer), this preliminary report nevertheless provides an insight into Soviet plant capacity, products and production goals in a variety of metalworking industries

Any analysis of Russia's industrial might (or the possible lack of it) should be based on three premises:

- The Soviet industrial plant will remain, though ministries may come and go.
- It is always good to know how the competition is doing.
- Should trade develop between the United States and the USSR, much of it will be done between individual firms here and individual plants there.

This is the opinion of Richard W Wallace of System Development Corp's Paramus, N J, facility, who as a hobby has made a study of Russia's industrial complex, its products and production methods.

Admittedly, Wallace as a private citizen has used only unclassified Russian and U S data, but as far as he knows there is no comparable assembly of such information, listed by plants and classified by industry, available.

Agricultural machinery

Although great emphasis has been put on agricultural machinery in the Soviet Union, only a small sample of plants has been identified on the Wallace list.

The Minsk Tractor Works includes the original Soviet transfer machine —a 33-station cylinder-block line built by ENIMS (Machine Tool Institute) in 1947.

Other examples of automation include the Krasnodar plant, which opened in February of last year and is said to have a capacity of 1.6-million feet of roller chain per year for use in farm machinery. Soviet sources estimate that this plant has reduced the cost of chain by 50% and the labor content to one-sixth of what it was.

Most agricultural plants are evidently in the Ukraine. In addition to the Kharkov tractor works, this area includes the Krasnaya Zvezda (Red Star) Factory which produces 16 types of farm machines. On one of these, a sower that puts a measured number of seeds into a hole, scheduled production for 1960 was 40,000.

Automobile plants

Recent production of the Soviet automobile industry is evidently about 500,000 a year, three-quarters

of this being in trucks and buses. According to the Institute for the Study of the USSR, Munich, the Soviet auto industry consists of 22 plants. (The Wallace list includes 25 plants).

The newest plants reported by the Institute are:

- Byelorussian Automobile Plant in Zhodine. Formerly in manufacture of road-building machinery, this plant began conversion to dump trucks in 1959. The plant started with the MAZ-25, is now building the MAZ-530, a 40-ton, 450-hp truck with a diesel engine. The output is to be increased 4½ times by 1965, but the base output of this plant has not been disclosed.
- Engels Uritsky Motorbus factory on the Volga for the last two years has been producing a bus (ZIU-6) that seats 110 to 120 people, has two 100-hp gasoline engines, and a speed of about 45 miles per hour.
- Kremenchug automobile plant in Ukrania started in 1956 to manufacture 12-ton trucks. The new model has an 8-cylinder engine developing 260 hp. The plant also produces dump trucks and is scheduled to produce tractors that will handle 20-ton semi-trailers.
- Zaporozhye Kommunar automobile plant in the Ukraine previously produced grain combines, but has been rebuilt to produce small passenger cars. Engines come from the Melitopolsk motor plant and other parts are produced by feeder plants in the region. Evidently an assembly plant, Zaporozhye is scheduled to go into production soon on a four-passenger car with a 4-cylinder 23-hp engine.

Three plants are believed to be heavily automated: GAZ, Likachev, and Yaroslavl. The Likachev plant in Moscow is the largest auto plant in the USSR, employing 50,000. This plant produces the ZIL, a luxury limousine, but the bulk of the daily output is 400 4-ton trucks, 25 buses, 1500 bicycles, and 300 refrigerators. Plans are to move both the bicycle and refrigerator manufacture out of this plant.

It was the Likachev plant, incidentally, which developed and produced bevel-gear making machinery closely patterned on US designs for such equipment.

Construction machinery

Nine plants are identified in this section of the list, four of them producing cranes. The Dnieper Machine Plant has built a crane with a lifting capacity of 80 tons; the others build cranes ranging from 10 to 75 tons.

Prototypes of machines for laying and compacting stone road foundations and for laying asphalt have been built at one plant, though no evidence is reported of their manufacture.

An excavator with a bucket capacity of 494 cubic feet is produced at the Uralmash plant in Sverdlovsk. A clue to the state of some part of Soviet construction methods may lie in the fact that the Soviet source for this entry described it as performing the equivalent labor of 7000 workers.

Machine-tool builders

Machine-tool plants are probably among the most widely reported and described of any in the Soviet Union.* Most of the 13 plants described are in the Moscow and Leningrad areas (where machine building seems to be concentrated), though two are in the Ukraine.

Wide publicity has been given both to the development of automated lines and to the "mass production" of some general-purpose machines. On the other hand, Wallace reports, an official Soviet survey has disclosed that the USSR is still using 350,000 items of obsolete, low-productivity equipment.

The only machine-tool plants for which employment figures are given are those for which data came from AMERICAN MACHINIST. These include plants building grinders (2500 workers), radial drills (2000), turret lathes (3500), engine lathes (5000) and contour mills (2500).

Among other plants is the Kolomna Works near Moscow, which builds large boring mills (work up to 41.5-feet diameter) and vertical lathes.

Novo Krematorsk in the Ukraine builds roll lathes with a 13-foot swing and a 50-foot bed.

Of particular interest is the description of the Special Machine and Automatic Line Plant in Moscow. This plant is scheduled during the current seven-year plant to build 145 automatic lines (this Soviet term generally means an inline transfer machine, but includes lines of individual machines connected by automatic handling).

By the end of 1959, the plant had built 17 automatic machines that were to be connected into an automatic line. Much of the planned production of this factory is for bearing production.

Metal-producing plants

A total of 12 basic steel and aluminum plants is included in the list. This data is largely a summary of the reports made by members of the US steel industry who visited the Soviet Union, but some of the data comes from more recent sources. Among the latter are a new rolling mill in the Moscow area.

Other industries

The list now contains 18 plants from other metalworking industries. The Second State Watch Factory in Moscow, with 7000 workers, produces 12,000 watches a day, and is said to be the largest watch plant in the world.

Vibrator Plant in Leningrad produces electrical instruments, including 9000 exposure meters and 1000 assorted other meters per month. Major product of the plant is galvanometers.

The Penza Factory, 350 miles east of Moscow, has 4000 employees producing digital computers. The URAL-I punched-card computer is produced at the rate of one every four days.

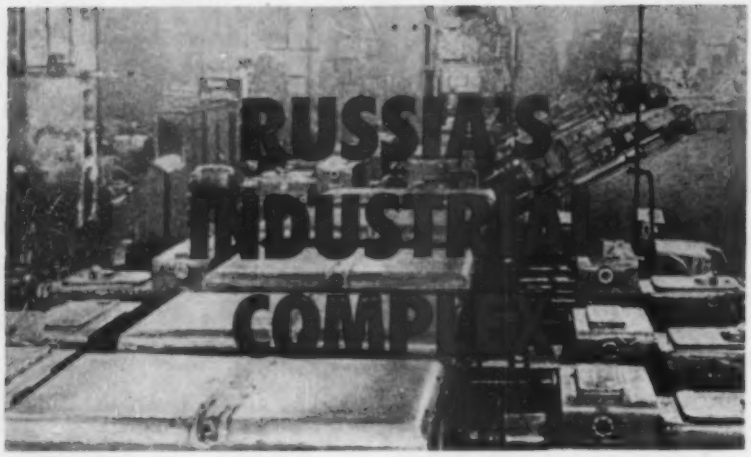
The Leningrad Printing Machinery Plant has produced a prototype machine for setting type that holds fonts twice the size of standard Linotype machines. It is intended for setting technical text containing formulas and foreign words.

There is also a current description of the First Ball-Bearing Plant in Moscow. This plant is last reported to have 15,000 workers and to produce 50 million bearings a year. •

* Descriptions of five plants are based upon the on-the-spot "Report on Russia" (AM—Nov 19 '56 to May 6 '57). Two others are based on "Automation in Russia" (AM/MM—Mar 21 '60).

Complete List Available

Space does not permit publishing the full text of "Selected Soviet Industrial Plants" by R W Wallace. For those readers with an interest in having the full report, the list is being duplicated. For a copy, send $1 to AM/MM Reader Service, 330 W 42nd St, New York 36, NY.



How good are Russian machine tools?

AM/MM's Paris Bureau asked French users for a frank evaluation of Russian machine tools as compared to those of Western Europe. The consensus: just as good

By Arthur Erikson,
AM/MM Paris Bureau

"We've run it 17 hours a day since we got it, and it's never given us a minute's trouble." Praise for Russian machine tools, in this case a double-upright vertical turning mill, is not uncommon in France today.

On the contrary, the French not only find many Soviet machine tools priced "ridiculously low" by Western standards, they find that performance is frequently equal to or better than that of their native product.

Just as good

Said one plant manager, whose plant has a Russian lathe, two shapers, a hydraulic slotter and a vertical drillpress, "We do the same kind of work and get the same results with our Russian machines as we do with the other machines in our plant.

"Our Krasnoi Proletari 1K62 has turned out completely satisfactory, even has features you can't find on comparable French lathes." He is referring to a standard lathe which Russia reportedly turns out at a rate of 14,000 a year.

But, the French say, there is a fly in the ointment. While the Russians pass muster as machine tool builders, they leave something to be desired as machine tool sellers. Delivery dates apparently mean little to them.

One French manufacturer, for example, still can't get a firm delivery date for a Gleason-type conical gear cutter that's already six months overdue. Even the French agent for Stankoimport (Russia's state-owned export service) puts delivery dates near the top of his list of headaches.

Russian prices for machines sold outright (most machines now in France are part of trade deals) are puzzling, too. Even though the man-hour content of a mass-produced lathe is about half that of an equivalent lathe from Western Europe, the price tag for a 1K62 deliverd at the dock is higher than that of a French one when duties and taxes are included.

6-spindle automatic for $20,000

On the other hand, a 50-inch-capacity vertical turning mill has a dockside price of $16,000. Another real bargain: a six-spindle automatic bar machine delivered dockside for $20,000.

This points up a two-pronged Russian drive in Western Europe—to prove they can make topnotch machine tools, and that they can undersell the West in its own backyard. Russian machines could well turn out to be best sellers in Europe.

World market

As to world markets, Russian machines are an even greater threat. Even the most hard-headed Western builder has to admit that the machines are hard to fault technically, even the mass-produced ones, and they can be priced somewhere between 30 and 40% below comparable Western machines.

Said a top French lathe maker recently, "When Russia can no longer absorb the 14,000 lathes coming out of Krasnoi Proletari every year, we'll be in for trouble in the export market."

How does the Krasnoi Proletari lathe stack up technically? A French lathe manufacturer has had one in service for over a year now. His overall judgment: completely satisfactory. The machine, he says, is extremely rugged and can be operated by a not-too-skilled machinist.

Too versatile!

He likes the range of spindle speeds (24—from 125 to 2000 rpm), the rugged bed and saddle, the hardened-and-ground ways. His only adverse comment, in fact, turns out to be a backhanded compliment, "It's too unspecialized."

It can cut, for example, just about any thread anyone anywhere could want—single or multiple, right or left hand metric pitch threads from 1 to 192 mm, English threads from 24-2 per inch, module threads from 0.5 to 48 mm, or diametral pitch threads from 96-1.

Another French manufacturer, who makes king-size components for several French machine tool builders, finds his Type 1553 vertical turning mill highly satisfactory, has run it steadily 17 hours a day for 10 years. It is at once rugged and precise, he reports.

One reason for the success of Russian machines in France, however: export machines are getting extra-special care in their construction. For example, boring machines slated for export have 4800 man hours in them, as opposed to about 3500 man hours for domestic ones.

Whether or not this extra attention to export models will continue after the Russians (as they hope) are firmly established in Western European markets is a question that only time will answer. •

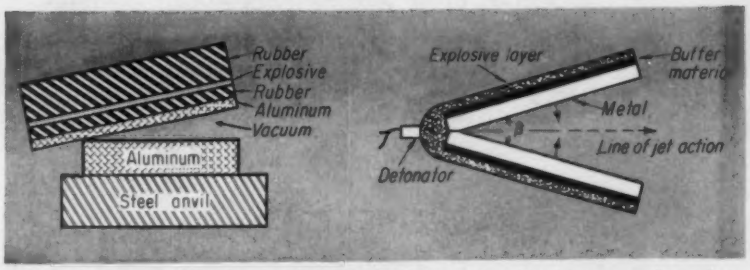
Now . . . it's explosive WELDING

Weld molybdenum to stainless? It's already being done. How about 4340, titanium, beryllium, or other refractories? These are all being studied right now. These materials and others, ranging from hard-to-weld to almost-impossible-to-weld, from aluminum to zirconium, are yielding to advances in explosive welding.

True, much experimental work remains to be done before explosive welding will be generally applied, even to the "special" problems. However, enough basic information has been developed, and enough pieces actually joined, to permit a certain amount of optimistic forecasting.

"Explosive welding . . . does seem to show promise where high reliability of the weld is necessary, where present welding techniques are complicated by the incompatibility of the metals to be welded or where application of heat degrades the strength of the materials. It opens up new possibilities for welding unusual materials, and for achieving large area welds," according to Dr Donald E Davenport, director of Poulter Laboratories, Stanford Research Institute.

Speaking at the ASTME High-Energy-Rate-Forming Seminar in Philadelphia, March 29-30, Dr Davenport and John Pearson, head of the Detonation Physics Group, US Naval Ordnance Test Station, China Lake, Calif, reported to over 100 scientists, engineers, and manufacturing executives on the latest developments in this new technique.



Two explosive welding setups illustrate the basic principle. Most tests have been made with aluminum and steel. But one company reports welding molybdenum to stainless, and is now studying welding of 4340, titanium, beryllium, other refractories

Here's how it works

Explosive welding depends upon a phenomenon known as "surface jetting." When two metal plates are brought together with a high relative velocity and at some angle to each other, there is a tendency for the material at the interface to be plastically deformed into wavelets or ripples. This is a jetting effect and, when confined to the surfaces, is known as surface jetting.

The interaction between the jet elements of the two surfaces, followed by a rapid release of the load, permanently welds the parts.

Experimental explosive welding setups are shown above; Dr Davenport's setup is at the left, Mr Pearson's at the right. The major difference between the two setups is that Pearson uses two moving plates, whereas Davenport uses one moving plate and one fixed plate. There are other differences—the angle between the plates, Dr Davenport's use of vacuum, weight of explosive, plate size—but the basic operation is the same.

Let's look at the system with two moving plates. The plates are oriented at some angle β, and the outer surfaces of the plates are coated with thin layers of explosive. Buffer material such as rubber, plastic or other metals, may be inserted between the explosive and the plates to attenuate the explosive force.

When will it work

As the detonation waves propagate along the explosive layers, the plates are collapsed against each other with a high relative velocity. Provided the velocity of the point of contact is within the proper range for the metals being joined, surface jetting will take place and the plates will be permanently joined.

The easiest type of explosive welding is that involving plates of the same metal, say, aluminum to aluminum. Even here certain variables must be held within definite ranges if sound welds are to be produced. Mr Pearson reports successful welds between ¼-in.-thick steel plates when angle β was anywhere from 7° to 50°, provided both plates were coated with explosive, and at angeles at 1¼° to 20° when only one plate was coated. He also reports welding several aluminum alloys with an angle of about 15°.

Dr Davenport reports angles of 1° to 2° for welding aluminum in a one-moving-plate setup. Other work at Stanford Research Institute lists an angle of 20° in the welding of copper to steel. Such bimetallic systems present greater problems. Each metal has a range of pressures and a range of angles that will produce a weld. Two different metals can be welded only if their ranges overlap. Obviously, Stanford Research Institute found that both copper and steel exhibit surface jetting at an angle of 20° and was able to find a pressure that suited both materials.

This won't always be the case, however. Take a steel-lead system. The pressure range within which steel will surface-jet is much too high for lead; the lead would be thrown off in an actual jet, and no bonding would occur.

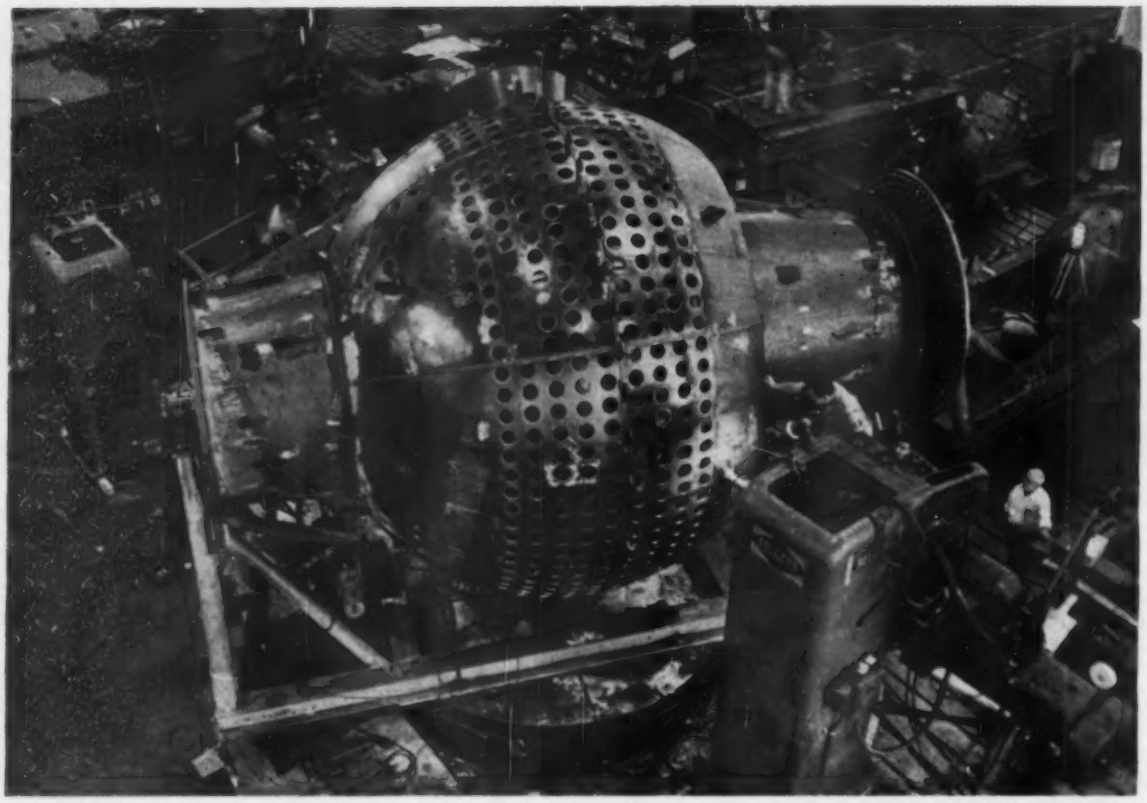
Strong, hard welds

Tests to date show that when a good explosive weld is tested in either shear or tension the metal normally fails through the parent metal, not through the weld area.

Explosive welding also hardens the materials. Two ¼-in.-thick mild steel strips with a Vickers hardness of 185 were welded explosively. After welding, the surfaces that had been in contact with the explosive measured 260 VHN, the weld interface 275 VHN, and the lowest hardness measured in the welded sample was 205 VHN.

Applications

Possible applications seem limited only by cost and production techniques. Cladding of chemical vessels and piping; welding of such materials as aluminum, zirconium, and magnesium; welding of dissimilar materials—all are within the potential of explosive welding. •



Trepanning tools, piloted by drills, do actual cutting of 5.125-in.-dia holes through inner and outer spheres. Machining is done by two horizontal boring machines. All holes in outer sphere are drilled first, then bushing in each outer hole guides drilling of inner hole, on same centerline. Device is for submarine

Master templet achieves 100% reproducibility

Drilling a super sphere

Almost as tricky as those Chinese ball-within-a-ball-within-a-ball carvings are the spherical weldments which house electronic equipment for the Navy's latest attack submarines.

Essentially, the job involves wrapping a 14-foot-diameter sphere around an 11-foot-diameter sphere of inch-thick HY 80 armor plate, keeping roundness and relationship of the two spheres within plus one-quarter inch, minus one-half inch.

Then comes the *really* difficult part of the job: drilling several hundred holes through the outer sphere into the inner sphere, to charted latitudinal-longitudinal coordinates.

To accomplish this, Baldwin-Lima-Hamilton Corp engineers decided to rotate the work around each of two axes rather than reposition the tool for each drilling. The vertical positioning templet: A 96-inch diameter steel indexing plate bolted to the support cone of the assembly (see photo above).

Complex assembly

The completed assembly consists of a sphere-within-a-sphere, capped at opposite poles by truncated support cones (for vertical mounting of the assembly in the bow of the submarine), and an "access cone," added midway between the two polar cones and perpendicular to their common axis. The access cone connects the sphere assembly with the inner shell of the submarine hull, and it also lets personnel get into the sphere.

Standing 22 feet high from cone tip to cone tip, the structure thus has an 11-foot-OD inner sphere and a 14-foot-OD outer sphere, separated by a supporting-rib structure, which must maintain the separation at 18 inches, plus or minus 1/32 inch.

The structure not only houses electronic gear, but serves as a functional part of the equipment as well. And because of this dual role, inaccuracy in sphericity, rib construction, or machining of the holes will interfere with correct functioning of the equipment.

"Orange peel" construction

Sphericity of the assembly is first established by assembling the inner sphere. This is done by tack-welding 12 "orange peel" segments of HY 80 armor plate around bar-stock frames to form two hemispheres.

Frames are then removed, the two halves are held together, and all the seams are completed by multi-pass welding.

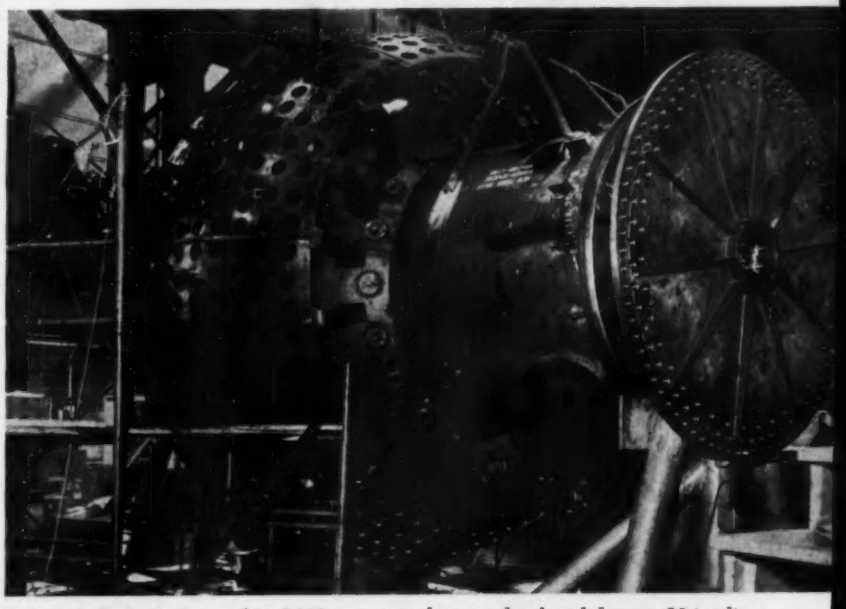
Individual segments are press formed from inch-thick plate, heat treated for temper, then restruck in the press to a size tolerance of plus ⅛ inch, minus zero, on a 68-inch outside spherical radius.

After these segments are joined, all welds must pass 100% radiographic inspection—because the inner sphere and its entry cone will become part of the submarine's inner hull and must be able to withstand the same pressures as the hull.

Five horizontal and 19 vertical ribs support the spheres. To prevent damage when the holes are drilled, rib spacing must be accurate within 1 degree. More than 50 different sizes and shapes of segments comprise the rib assembly.

Formed orange-peel sections of ½-inch-thick HT 16113 are welded around this supporting rib structure to form the outer sphere.

Producing inner sphere round within plus ¼ in., minus ½ in. tolerance on its 11 ft dia is first step in creating this unique structure



For vertical positioning within 0.002 in. a templet was developed from a 96-in.-dia steel plate. Containing three concentric circles of holes toward the outer edge, projected from the charted coordinates, the templet was bolted to the support cone of the assembly, opposite the trunnion drive. Placing a pin in the desired templet hole locates the sphere for drilling

Ready for drilling

Each set of holes (a set is one outer sphere hole in one diameter, and one inner sphere hole in another) must be drilled on a centerline which, if projected along the axis of the drill, will intersect the geometrical center of the inner sphere to within plus or minus three minutes of arc. Hole spacing is described in a coordinate pattern of latitudes and longitudes.

Each 5⅛-in.-diameter hole through the outer sphere becomes the center of four ¼-in.-diameter bolt holes, spaced 5.375 in. apart, within ± 0.005 in. These bolt holes must align properly with holes in holder tubes between the spheres—and sufficient metal must be left between the bolt holes and the larger hole to assure sufficient ligament strength. Several other requirements make even the slightest deviation in positioning critical.

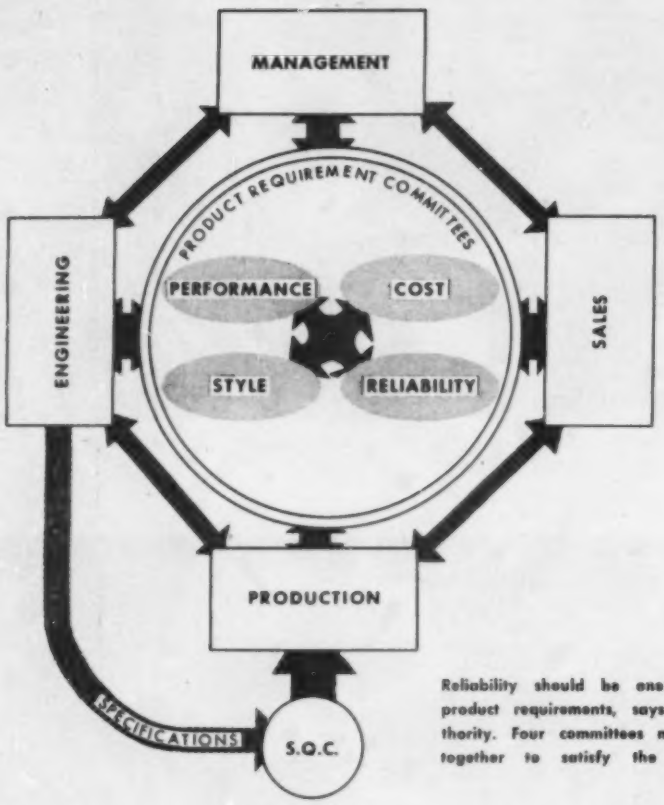
Avoid costly tooling

B-L-H engineers recognized that complex and costly tooling could be avoided if this massive workpiece could be rotated with the tooling fixed, rather than rotating the tooling around the work. Greater tool rigidity would be possible and several machines could drill at once. Further, standard horizontal boring mills available in the B-L-H shops could be used, and expense and delay in devising special tooling and fixtures could be avoided.

Several problems cropped up as the manufacturing method was devised. For example, the inner sphere could not be handled magnetically because magnetized armor plate deflects the welding arc.

By simply turning the entire vertical-mounting sphere assembly on its side, a shaft could in effect be run through the center axis of the now horizontal assembly. The shaft ends were made to serve as trunnions. The entire assembly was suspended on a cradle which supported this shaft at the ends. The cradle, in turn, was mounted on a standard indexing table.

A master guide templet solved the problem of drilling the vertical holes precisely to the charted coordinates. To position the sphere for drilling the operator need only turn the assembly, put a pin into the desired templet hole, and drill. Quality control inspection has shown that results from the templet are 100% reproducible. Vertical positioning is consistently within 0.002 in. of the charted coordinate. •



Reliability should be one of four product requirements, says one authority. Four committees must work together to satisfy the customer

The growing problem of RELIABILITY

As the automotive industry prepares to launch a vigorous attack against the problems of unreliability, the aircraft and related industries find themselves trying to solve the problems that reliability brings. However, many of their troubles are the same, as was brought out at the SAE National Production Meeting in Detroit March 13-17 and its National Aeronautic Meeting held in New York April 4-7.

Just defining the term is a headache. At a panel discussion on Product Reliability during the New York meeting, the basic premise was that a definition would not be attempted but that, rather, a "feeling" or understanding of the subject would evolve. No single answer emerged.

However, a good starting point was offered in a paper by Herb Kean of Wright Aeronautical Div, Curtiss-Wright Corp. He includes two phases of reliability: the first might be called designed-in reliability, and the second—of equal importance—is the built-in reliability afforded not by the design engineer, but by the man building and servicing the product, the production man. Kean defines reliability, then, as "keeping the customer satisfied." This seems to sum up today's trend of thought.

Establish product committees

In Detroit, Hall Cary of Battelle Memorial Institute challenged America's automakers to take the lead in industry's coming war against unreliability. In a talk called "Quality Control versus Reliability," Cary outlined the basic differences between these two fields, and proposed a scheme for creation of a reliability program as painlessly as possible.

Cary's opinion—one also held by most participants in the New York panel discussion—is that reliability, rather than being just another type of engineering, is one of the overall factors that determine product requirements, and should be treated as such—just as performance, cost, and style are determined at present.

Since product requirement committees already exist, Cary suggests that establishing a reliability requirement committee is a painless yet effective way to start a reliability campaign, especially since the major sources of reliability information already exist.

Equal status

It should be remembered, he concludes, that reliability engineering and quality control are unique functions in the industrial organization. Each plays a vital role. The reliability committee should not be subservient to quality control group, or vice versa. A member of the quality control group should serve on the reliabiilty committee, but this committee must not be composed solely of quality control people. Other skills are needed.

Use QC information?

Cary makes a special point of emphasizing that quality control inspection data is not of interest to the product requirement committee. This he says, emphasizes the difference between reliability engineering and quality control engineering. Each requires a different type of data.

The quality control man needs to answer the question: "Does the product meet requirements?" The reliability engineering group needs data to answer the question: "What should the product requirements be?" So he gets his data from exploratory experiments—experiments designed to find out, not to prove, the capability of a given mechanism.

In short, the product requirement committees gather data that serve to define the state-of-the-art. For this reason, they are more interested in the engineering tests—mock-up tests, prototype tests, assembly proof tests, and field service records. Inspection data is of limited value.

However, the New York panel points out, quality control rejection-rate data can be valuable feedback information. If the rejection rate is low, the product is often considered more reliable by the customer.

Waiter, or boat?

Two analogies were given the New York group. Lloyd Steward of GM's AC Spark Plug Div sees reliability as a boat in which engineering, manufacturing, purchasing,

and quality control all must ride. It takes team-work or pulling together, Steward says, to create the kind of reliability that will give a product superior advantages over its competitor in the field.

At another point in his paper presented in New York, Steward likened reliability to a waiter serving information to manufacturing, engineering, and to purchasing. This identifies reliability as a service organzation. It feeds back information to manufacturing concerning scrap costs and quality levels hour by hour; for engineering, it provides reliability attainment compared with specified objective; for purchasing, it gives vendor ratings and investigates sources of supply.

Problems in production

The New York panel points out that many design methods are in use, but that most companies lack ways to control degradation of reliability in production. And a lot of this trouble is in attitude, according to Herb Kean in his paper "The Production Man's Role in Product Reliability." He offers three ways to help insure that production builds in the reliability that design has called for to meet product requirements:

- Help production men understand the operating function of the end product, and thereby stimulate pride of workmanship.
- Get to know the capabilities or limitations of equipment available.
- Development of effective troubleshooting techniques, so that personnel know what they expect to prove before they run a pilot lot.

Product reliability, he concludes, takes a coordinated effort on the part of all production men; it requires that they adopt an overall attitude toward reliability of keeping the customer satisfied. This mixing operation requires delicate skill, according to Kean, and should present the greatest challenge to the production man that his profession has ever seen.

Why R all-of-a-sudden?

Reliability is not really new. Up to just recently, however, reliability was a by-product of normal manufacturing activity. Now, in this electronics and missile age, products are much more sophisticated, and designers are pushing materials much harder than they once did.

And, manufacturing's role in reliability is not just meeting specifications, panel discussion points out. Particular manufacturing methods must be understood by design, and followed by production. Continual exchange of information is important, and often difficult. Forming methods must be analyzed, and specified materials must be used. How a thread is made may determine whether or not it is reliable enough. A screw might rupture from stress much too soon if it is cut rather than rolled.

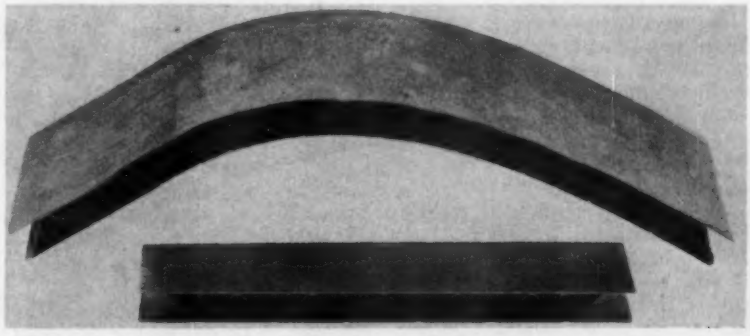
Manufacturing must be educated to understand and work with design; production personnel must be educated so they can communicate with the man-on-the-machine; management must be educated to understand the concept of reliability as it relates to product requirements.

The basic problems in reliability, as summed up during open discussion, are organization and education. Although a good percentage of the success of a sound program rests on the design engineer's shoulders, reliability is everyone's business. •

Build 'em solid; leach 'em out

A new concept in sandwich panels employs a metal filler in the "open" spaces during joining and forming and then leaches out the filler to produce a lightweight panel that's almost as rigid as a honeycomb sandwich and is claimed to be simpler and less costly to manufacture.

Sponsored by Douglas Aircraft Co at Battelle Memorial Institute, the method involves a fast joining process called roll welding. The assembly is hot rolled to form pressure welds wherever the core and the covers meet.



Corrugated sandwich panel is formed with metal filler in "open" spaces

36 x 72-in. panels

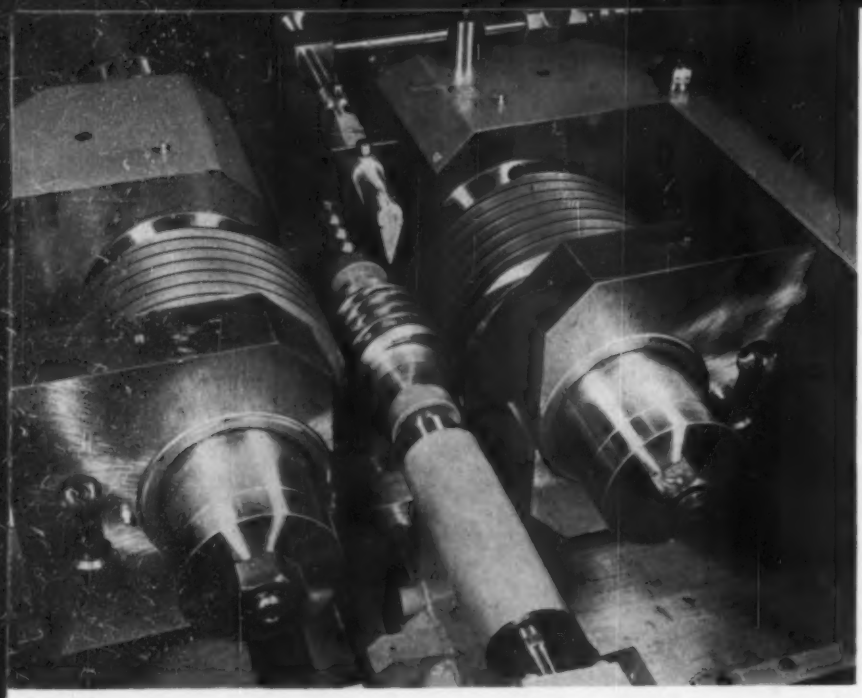
So far, ¼-in. panels as large as 36 x 72 in. have been produced, but rolling-mill capacity is the only limitation on size. Materials have included 2014 aluminum, B-120 VCA titanium, unalloyed A-55 titanium, steel, molybdenum, and Inconel.

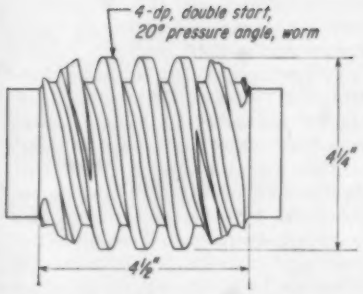
Assembly starts with an accordion-pleated sheet of metal. Then V-shaped bars of iron or copper are placed in the V's of the corrugations, on both sides. Next, a rectangular steel frame is placed around this core, and the face sheets of the sandwich are added.

Over each side of this assembly is placed an additional steel cover sheet that is welded to the steel frame. The whole package is then hot rolled in a direction parallel to the corrugations to weld the core to the cover sheets.

After rolling, the retaining frame is sawed or sheared off, and the steel covers are peeled away. With the support wedges still in place, the panel can now be formed into a wide variety of shapes, including hemispheres, without core buckling.

The V-shaped inserts are then leached out of the formed structure with a chemical reagent such as nitric acid. Leaching may take several days for large panels, but it's not an expensive operation, and many panels can be treated simultaneously. •





Rolling pressures up to 200,000 lb make it possible to roll 4¼ inch, 4 DP double-start worm threads. This worm, of SAE/4140 steel, is 4 inches long and could be used in a speed reducer or construction equipment drive

Roll threading goes massive

Powerful new roll threading equipment is opening up new vistas for economies in jobbing and mass production of heavy work—moving the process beyond the fastener and small worm fields

By Rupert Le Grand,
senior associate editor

Large manufacturers are today eyeing thread rolling as a means of making parts far larger than the fasteners which are the traditional end-product of this process.

Reason is that now for the first time roll design is such, and equipment big enough and powerful enough to create coarse pitches in work several inches in diameter.

Not only that, it has been successfully demonstrated that materials of high yield strength, such as refractory alloys, high-nickel alloys and gear steels can now be thread rolled. If spindle deflection is controlled, large amounts of power can be applied to roll threads on such work as:

- 4-in, 8-pitch threads on "Refractalloy" 6-foot-long studs for high-pressure turbines.
- Big worms for speed reducers or construction equipment drives.
- Continuous rolling of long bars with stub-tooth helical splines. (Possible use: making gear blanks perhaps at a cost 1/25th that of a hobbed green gear).
- Acme leadscrews.

New, powerful equipment opens the way for shops to use temperature-resistant steels, high-nickel steels and gear steels.

High-powered equipment can also improve the hardness and wear life of heat-treated steels rolled at Rh 26-32 C to such an extent that further heat treating may not be required. Or if higher hardness than that produced by rolling is required, the accuracy of the thread or the tooth form will minimize grinding.

Other boons, too

There are other boons offered by high-power thread rolling: speed of producing the thread form, and elimination of a considerable number of operations.

For instance, a 4-inch, 8-pitch thread, back tapered and 4¼ inches long, can be rolled in Refractalloy in 5 seconds. Rolled 18-tooth pinion bar stock has been produced experimentally at the phenomenal rate of 48 linear inches per minute. Research and development of the process is continuing.

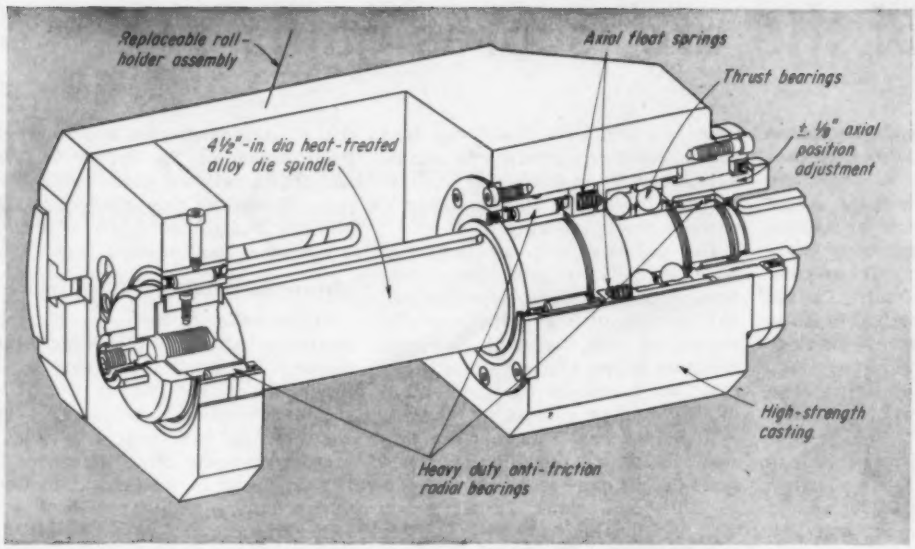
Some shops can use power thread rolling on mass production jobs that run month in and month out. But others must be free to do jobbing work in a variety of sizes, and by through-feed or infeed methods.

Because of this variety of workloads and schedules, Landis Machine Co of Waynesboro, Pa, which makes the Hy-Duty Model 48 high-powered thread roller, sought first to eliminate spindle deflection (the bugaboo of thread and form rolling) and second to achieve a flexibility of setup applicable to a wide range of work diameters.

High rolling loads call for heavy spindles on the Hy-Duty 48. The nominal diametric capacity of the machine is from zero to 6 in. maximum for infeed rolling. The range for through-feed rolling is from zero to 4 in. maximum diameter.

The large 4½ in. diameter spindles needed to provide the rigidity for such heavy-duty rolling require large bearings, and so the dies for heavy-duty rolling must also be large, ranging up to 12 in. in diameter by 12 in. in length. However, where the work to be rolled does not demand such heavy-duty equipment, replaceable spindle units with 3 in. diameter spindles can be furnished so that very much less expensive dies up to 8 in. in diameter can be used.

The span is such that additional bearing housings can be inserted to give closer support to dies, when smaller dies and spindles are used. Thus for smaller work the cost of dies is kept within an economical



Deflection is minimized by using 4½ inch spindles mounted in quickly replaceable roller bearings. It is practical to roll stock down to 1 inch, because spindle units are quickly replaceable, and they make possible the use of smaller, low-cost dies

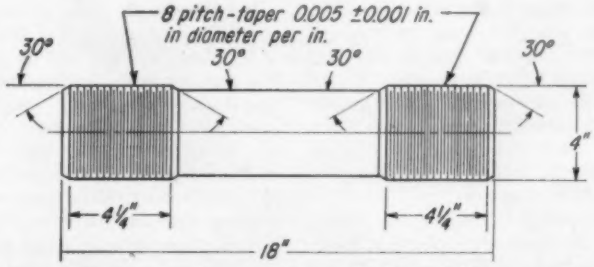
range. Axial adjustment of the spindles is ± ⅛ inch for die alignment.

To minimize cycle time, the Hy-Duty machine is provided with a two-speed motor and a two-pump setup. The motor starts in low speed (to get heavy workpieces turning) then shifts to high for the rolling operation.

Both pumps supply oil for rapid traverse of the rolls to the work. Then, when the rolls are about to contact the work, one pump cuts out and the other supplies feed in inverse ratio to rolling pressure or resistance to penetration. Thus feed is faster at "attack" than near the conclusion of the rolling operation. When the part is finished, rolls are moved back at the fast traverse rate.

Both roll spindle assemblies may easily be inclined to 10° in either direction from horizontal. This angularity is more than sufficient to include the helix angle of any standard AN/UN or Acme thread within the through-feed capacity of the machine. And it permits the use of annular, single-start, or multiple-start helical through-feed dies—as best suits the application. A reference scale, graduated to ½ degree, is located on the front face of both roll-holder assemblies for easy, accurate setting of the spindle inclination.

Big work requires big equipment. The 21,000-lb Model 48 Hy-Duty machine measures 8 x 8 feet. Power originates from a 50-hp motor. •



Large studs for turbines, presses and other machinery can be rolled in a few seconds per thread. Studs have been rolled in Refractalloy, also 4911 and 8337 having initial hardness of Rh 26-30 C

Movable die and housing are attached to a 12-inch-diameter section of a 14-inch-diameter piston to eliminate elastic connections. The hydraulic cylinder, rod and piston actually comprise the die slide to eliminate ways and gibs. Major sections of Hy-Duty machine are constructed of 3-inch plate

"State of the arc" scores gains

Even after its giant strides in recent years, arc welding continues to produce new developments. Some are aimed at making it a more useful tool in the shop. Others are specific answers to nuclear and space problems, but these, too, will probably reach the shop eventually in the form of better tools and techniques.

Outstanding in recent developments have been new techniques and applications of Mig and Tig welding. These, of course, are the semiautomatic processes where the operator welds with a "gun" instead of with a stick electrode. Tig is the one with a non-consumable electrode, usually tungsten, and Mig is the one that feeds a consumable electrode wire through the gun and into the arc.

Arc spot takes lead

The most prominent innovations have been in arc spot welding, the process that can weld two sheets together when there is access from only one side. To make an arc spot weld, the operator places the gun against the work, pulls the trigger, and holds the gun in place during the automatically timed weld cycle. The arc melts through the first layer and into the second, and the two layers fuse together.

In a paper prepared for the American Welding Society's Annual Meeting this week, R P Sullivan of the Linde Co points out that the slope-controlled power supplies have improved the reliability of the process and that special torches are no longer necessary. Now you can convert to Mig spot welding simply by adding a timing function to an otherwise standard control.

"Meatless" sandwich panel

But the newest aspect of this process is a technique that he calls "space welding." This doesn't necessarily have anything to do with *outer* space. It's a method of welding two parallel sheets together with a space of as much as ¼ in. between them. He claims that two sheets of space-welded 1/16-in. carbon steel were almost twice as resistant to deflection as a single sheet of ⅛-in.-thick carbon steel.

Among the exotic problems that show the way toward better methods for the everyday shop is a Tig spot welding job at General Electric's Aircraft Nuclear Propulsion Dept. R J Campbell and D R Miller say that conventional equipment was unable to make welds in 0.060- and 0.040-in. Inconel, Inconel X, and Hastelloy X without crater cracking.

The solution was an improved welding machine with these features: up- and down-slope control, the addition of filler wire, precision control of weld time with Deketron counting tubes, and a feedback circuit that maintains constant output of d-c welding current.

An added benefit is that the precise control and the filler wire additions permit more freedom on sheet-to-sheet dimensions. Instead of a limit of 0.005 in., two sheets of Type 316 stainless steel, 0.030 in. thick, can now be Tig spot welded with a gap of 0.030 in. and still have tensile shear values twice as high as required.

Remelt improves weld

In discussing the problems of welded rocket cases, E J Wilson, Jr, of the Army Rocket and Guided Missile Agency, says that fusion-welded longitudinal cylinder seams are among the worst offenders. However, he also gives a pointer that might be useful to more people than just those in missile work. Remelting the weld surface with an oscillating Tig torch refines the coarse-grained structure, washes out porosity and microcracks, and smooths the weld.

Welding is not a cure-all

In the same general field, however, we have a claim that ". . . furnace brazing offers several distinct advantages over welding . . ." in the fabrication of ultra-high-strength steel for missiles. "Considerably less distortion, effective elimination of thermal gradients, and uniform stress distribution throughout the brazed joint," are cited by M J Albom and R E Anderson of Aerojet-General Corp.

Another competitor of arc welding is electron-beam welding. A paper prepared by J L Solomon of Sciaky Brothers Inc reports on a new machine that can weld materials ranging from 0.005-in. tantalum to 1-in. plates of aluminum and 4340 steel; depth-to-width ratios are as high as 12:1 with a voltage of 30,000.

One of the advantages of electron-beam welding pointed out by R D Mann of Air Reduction Sales Co is that all the energy goes into the weld itself; much of the energy in Tig welding is radiated to the surroundings. Because of this, electron-beam welding can go faster, and it leaves a narrower heat-affected zone.

Ultrasonic welding works

Still another of the newer joining methods, ultrasonic welding, receives a big boost in a paper by J Koziarski of The Martin Co. "Ultrasonic welding," he says, "has come of age. It ceased to be a laboratory curiosity some time ago. It is being used in current production where other joining processes are either unacceptable or impossible, or even uneconomical.

"The main uses today are in joining dissimilar metals (very thin to very thin or very thin to thick sections) and where heat, used during joining by other methods, is objectionable . . . Tomorrow, ultrasonic welding will probably find its main application in joining refractory metals and alloys, dispersion hardened alloys and alloys made by powder metallurgy processes."

But he says that the new process needs established engineering criteria, process, specifications, and quality control requirements—soon—and no company can afford to set these up by itself.

New jobs for old process

New applications are also being found for at least one old familiar process—flash welding. **"Arc-cast molybdenum (0.5% titanium) can be flash-welded using conventional equipment and techniques, according to E G Thompson and H Binder of The Marquardt Corp and H Collins of Dresser Industries, Inc.**

Significance? "The program has shown the potential of using simple preforms produced by flash welding, and, through application of shear spinning methods, fabricating more complex sheet metal hardware."

And another flash-welding development is reported by M E Bylin from Sweden. With a special machine, his organization has been able to flash-weld cast iron. The machine has an automatically controlled motor-driven upset which gives considerably lower upset speed than a hydraulic machine. Accurate control and low specific pressure are important features of the process. •

American Machinist / *Metalworking Manufacturing*

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Deceptively simple, vapor degreasing is one of those taken-for-granted operations that can pile up hidden costs, if improperly handled. Yet it can be a most effective and economical method of removing oils and other soil from metal. Here are ground rules for selection, installation, operation and maintenance of a variety of setups for...

VAPOR DEGREASING

By H E Linsley, associate editor

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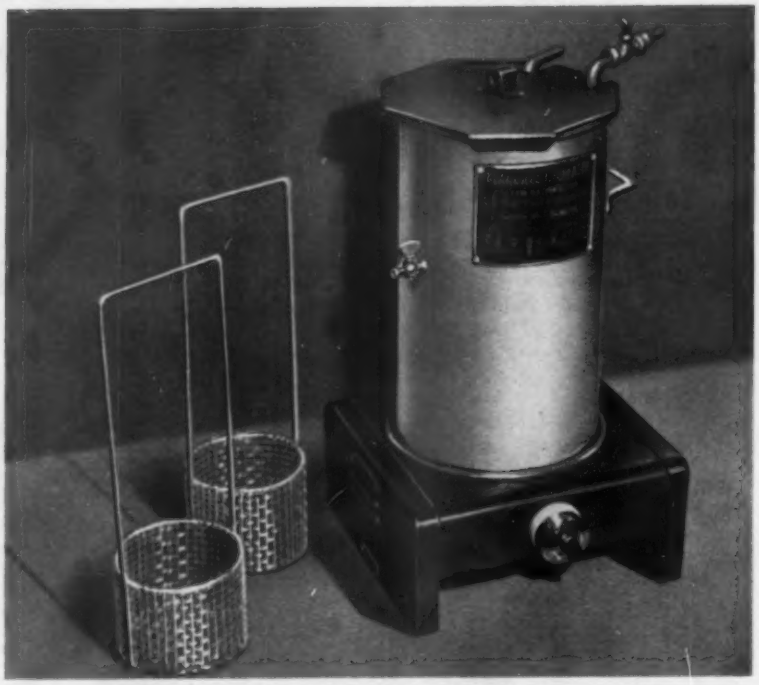
VAPOR DEGREASING

From hot-plate portables . . .



Simple vapor degreaser, such as this model used for cleaning sparkplugs, may be heated by electric hotplate and finds wide use in light industry

Vapor degreasing is *not* a difficult operation, nor is it a dangerous one. Not, that is, if the operator has the right equipment for the job, knows what he is doing, and understands the materials he is handling.

This combination of operator skill and the right tools for the job, coupled with elementary, common-sense safety precautions, makes for a highly effective and economical method of removing oils and contaminants from metal surfaces.

First order of business in setting up a vapor degreasing operation is, of course, choosing the right equipment. Here, two don'ts are mandatory: DON'T try to build your own, and DON'T buy from a catalog, without first discussing your particular needs with manufacturers.

Size and type of machine depend not only on the size and shape of the work but also on the method of racking, expected hourly production, and the amount of soil (dirt, oil, contaminants) normally present. Also to be considered is the heating medium—steam, electricity, or gas.

All vapor degreasers, even the smallest, are carefully engineered, although they appear simple. For this reason attempts at "home made" units can be disastrous. Long experience is necessary to produce an effective unit, which must take into account the type of work, production rates, the metal to be handled, solvents, and the nature of the soil to be removed.

And these basic considerations in turn govern the type of heating arrangement, heat input and output for all load conditions, height of freeboard, and operational and safety controls.

Home-made degreasers, in short, are usually uneconomical and frequently dangerous. The relatively few dollars saved by not purchasing a machine may be offset within months by heavy solvent losses.

The smallest unit commercially available is a straight vapor type with a capacity of only a few quarts of solvent. This unit may be heated on an electric hot plate, or by a small gas burner. Its uses include cleaning spark plugs, jewelry, and small precision watch and instrument parts.

At the opposite end of the size scale are machines 90 feet long or more, designed to handle fabricated metal sheets on a continuous conveyor line. Between these two extremes are units of almost endless size and type.

Essentially, however, a vapor degreasing machine consists of an open steel tank and an external or internal heat supply. All inside surfaces are protected against corrosion by galvanizing or plastic coating.

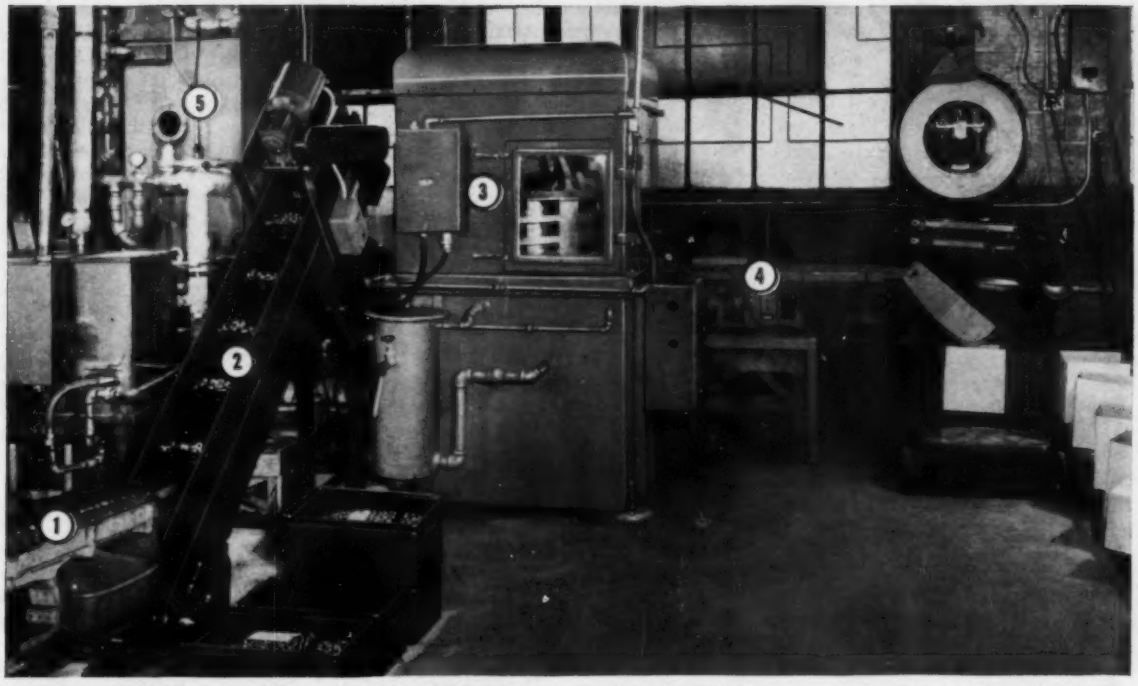
A condenser, which may be an external jacket, an internal coil, or both, is located below that part of the tank wall known as the freeboard. This freeboard protects the vapor from drafts or from spillover when the work is immersed.

The degreasing unit has one or more double-wall partitions (depending upon the cleaning cycle) to separate the boiling, warm, and vapor sections. These partitions are so arranged that overflow is toward the boiling tank, and the warm liquid is not contaminated.

Around the inside of the tank, just below the condenser, is a small trough for collecting condensate. A pipe leads from this trough to a water separator, from which clean dewatered solvent is returned to the tank. A cleanout port near the base of the tank allows manual removal of accumulated oil and sludge, and a perforated plate prevents dropped work from falling to the bottom of the tank. A safety thermostat near the bottom of the boiling tank prevents overheating of the solvent, and a vapor-level thermostat, usually located just above the condenser, shuts off heat if the vapor rises above normal levels.

Automatic conveyorized machines are available for continuous operations. For small parts, a cross-rod conveyor is common, while a mesh

degreasers range up to complex vibratory setups



Continuous processing of small parts is performed with this vibratory cleaner setup. Work travels along shaker conveyor *1* for removal of excess oil and chips, is carried up elevator *2*, and discharged into vibratory degreaser *3*. Cleaned parts are discharged to shaker conveyor *4* for final chip separation and delivery to weigh scale. Solvent is distilled in separate still *5*

belt or monorail system is usually preferable for larger parts.

Installation

Don't stick a degreaser in any odd corner of a plant—the smaller, open tank units particularly must not be installed too near windows, doors, or fans which cause drafts that will carry off solvent vapor. And it is essential that degreasers be kept well away from radiators or other heat sources.

Automatic, conveyorized degreasing units can usually go right into the production line with little or no special precautions for ventilation, but if a machine with an open area of 600 square inches is installed in a less-than-8000-cubic-foot room, mechanical ventilation is essential.

Don't confuse drafts with ventilation—a strong draft can pull vapor out of the machine and cause a serious loss of solvent (chlorinated hydrocarbon), which may affect nearby workers. Gentle air circulation will, however, disperse the small amount of vapor that may normally escape from a degreaser.

Both degreasing vapors are heavier than air (4.5 times for trichlorethylene, 5.8 times for perchlorethylene), so that they tend to stay in the tank. But some spillage usually results from improper use of the spray lance, too rapid loading and unloading, dragout, or leakage.

Such vapor mixes with the air and is carried away by the ventilating system, but it can be harmful if it comes into contact with anything hot.

Even when a machine is not in use, some solvent loss is caused by stray drafts and it thus pays to keep the tank covered. Trouble is, most machines are equipped with hinged steel covers so heavy and awkward to handle that operators conveniently "forget" to use them.

Not only that, if a cover is closed too quickly, it can push a mass of moist air into the tank, and this can cause trouble. Conversely, if the cover is lifted too fast, it can suck out vapor.

The answer to this is a roller cover made from plastic-impregnated, vapor-proof fabric. The free end is attached to the back of the tank, and the remainder is wound on a roller which can be pushed back and forth on tracks, opening and closing the tank. Solvent loss can be cut as much as 50% with this cover.

Avoid pits

A machine should be so installed that its top is waist-high to the operator. Incidentally, it is better to build a platform to raise the operator, than to set the machine in a pit, which can turn out to be an expensive nuisance.

A pit must be big enough to let maintenance men inside to remove the heating units and do regular cleanout operations, and it must have a change of air every minute or two. And because the vapors are heavier than air, the exhaust intake must be at the lowest part of the pit and as close to the cleanout door as possible.

Discharge should be outdoors, well away from air intakes. Also needed is a drain or sump pump to get rid of water in the pit, and gummy oil and dirt must be disposed of when the machine is cleaned. This must not go into sewers, but must be re-

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moved from the pit and disposed of in some other way.

Heating systems

Vapor degreasers may be heated by steam, electricity, or gas. If a steam heating setup is installed, it is necessary to follow the manufacturer's recommendations exactly. If the supply line provides pressure above that specified, it will be necessary to install a reducing valve, in a place where it is not easily tampered with. The valve should be set and locked at 15 psi for trichlor, 60 psi for perchlor.

Flues for gas installations must comply with local ordinances, and with National Board of Fire Underwriters specifications. That part of the flue outside the building should be of acid-proof material, and should not allow water to accumulate. There should be no openings or diverters inside the building. The lower part of the flue should have insulation reaching at least one foot above the tank, and its design should be such as to prevent backdrafts.

For electric heating, no precautions beyond those for all electric power installations are required. It is important, however, to keep heating elements covered with solvent to prevent their burning out.

Degreasing solvents

The two most commonly used vapor degreasing solvents, trichlorethylene and tetrachlorethylene (perchlorethylene) are chlorinated hydrocarbons. Although they act in much the same way, they are not interchangeable in the same degreaser. Both are supplied under various trade names—the major difference between brands being in the stabilizers which resist decomposition.

These stabilizers are permanent, are not affected or diminished by continuous distillation, nor will they attack or stain the metals to be cleaned.

The stabilizers distill at about the same temperature as the solvent, and do not combine chemically with acidic or alkaline substances which may get into the bath.

Solvents will not attack steel, aluminum, copper alloys, zinc, magnesium, or other metals commonly used in metalworking—but they may soften or affect some plastics.

Solvents are non-flammable at ordinary temperatures, having neither flash point nor fire point. But above 90 F, high concentrations of trichlor in air (about 15% by volume) can be made to burn mildly if exposed to strong flame or electric arc. Above 122 F, similar mixtures burn mildly if ignited by sparks or flames.

For most work, trichlor is preferred, because its low boiling point (188 F) requires only moderate heat, such as can be furnished by low-pressure steam, and only moderate amounts of condensing water.

Advantages of trichlor

Handling of trichlor-cleaned work is easier, because the work cools quickly and is not likely to cause burns. Trichlor is not soluble in water and is normally very stable, but it can decompose chemically under certain conditions. For instance, quantities of aluminum dust or chips in the tank can cause the solvent to polymerize, leaving a black, tarry residue.

Prolonged exposure to air can cause trichlor to oxidize and turn into phosgene, hydrochloric acid, carbon dioxide, or dichloroacetylchloride. However, modern stabilizers are so effective that oxidation is no longer a problem.

On the other hand, ultraviolet radiation speeds up oxidation, so the solvent should be protected from direct sunlight.

If too much water gets into the tank, the boiling temperature drops to about 161 F and cloudlike, "ghost" vapors appear. Because these are lighter than pure vapor, they are easily pushed out of the tank during loading, causing a loss of solvent. Water also sets up corrosion of the tank, and may cling to the work in tiny droplets, causing it to rust.

Trichlor begins to decompose at about 250 F, so it is important to keep the solvent and vapors well away from high heat, such as that of open flames, welding, electric heaters, and high-pressure steam pipes. In contact with such heat, trichlor breaks down into a toxic mixture of gases containing phosgene and hydrogen chloride.

Acids, which sometimes attack the tank and heating coils, can usually be neutralized by a small amount of soda ash, which is not soluble in trichlor but which dissolves in the small amount of water usually present, then reacts with the acid. However, the addition of fresh solvent usually stabilizes the contents of the tank and prevents decomposition of the solvent.

Advantages of perchlor

Perchlorethylene (tetrachlorethylene) is similar in most respects to trichlor, and the same precautions must be observed in handling it. Because perchlorethylene boils at 250 F, as opposed to trichlor's 188 F, its higher heat vaporizes any moisture trapped in porous metals, deep recesses, and blind holes.

It is also preferred for degreasing light-gage metals, which may reach the vapor temperature of trichlor before there has been sufficient condensation for complete cleaning. Too, the higher boiling point of perchlor permits longer rinsing.

Perchlor is sometimes preferred for cleaning aluminum, because it does not decompose in the presence of dust and chips, and is less likely to cause staining.

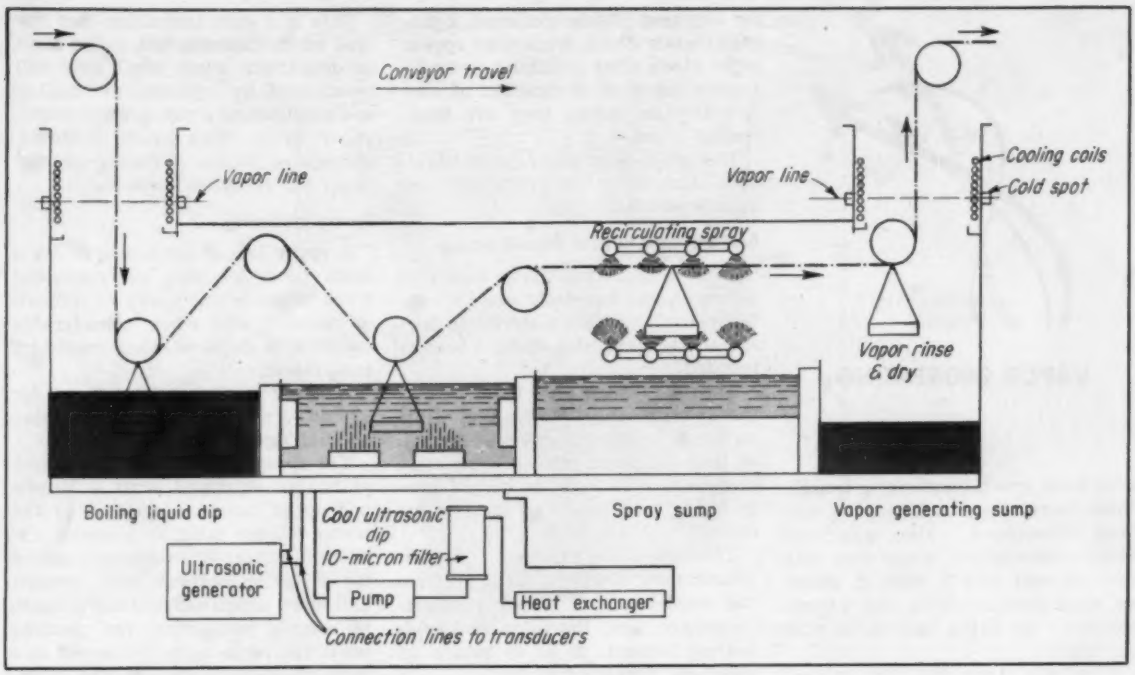
On the other hand, more heat is needed to boil perchlor (usually at 50 to 60 psi), and more water for condensing. And because the work is too hot to handle immediately, time must be allowed for cooling. Perchlor vapor is heavier than that of trichlor, so a simple thermostat can control the vapor level, in electrically heated machines, without the water jacket.

A third solvent, methylene chloride, is sometimes used in degreasing applications, when the soil is unusually adherent, or of such a nature that trichlor and perchlor cannot clean it adequately. Methylene chloride is particularly useful for stripping paint and lacquer—even latex paints and epoxy resins.

Pretreatment needed

Choice of a solvent depends chiefly on the type of soil to be removed. For instance, most oils and greases come off with trichlor, but some heavy animal-base fats require the higher temperatures of perchlor.

Tallow and some heavy packing and rust-inhibiting greases usually must be treated with detergent, so as to emulsify the oil and, in the case of tallow, proteins—before degreas-



Conveyorized setup carries work in continuous cycle through boiling dip, ultrasonic rinse, spray rinses, and final vapor rinse, is particularly useful for high production of parts on which absolute cleanliness is important

ing with perchlor. But some heavy greases, with a pour point between 202 F and 238 F, can be removed by perchlor without any preliminary treatment.

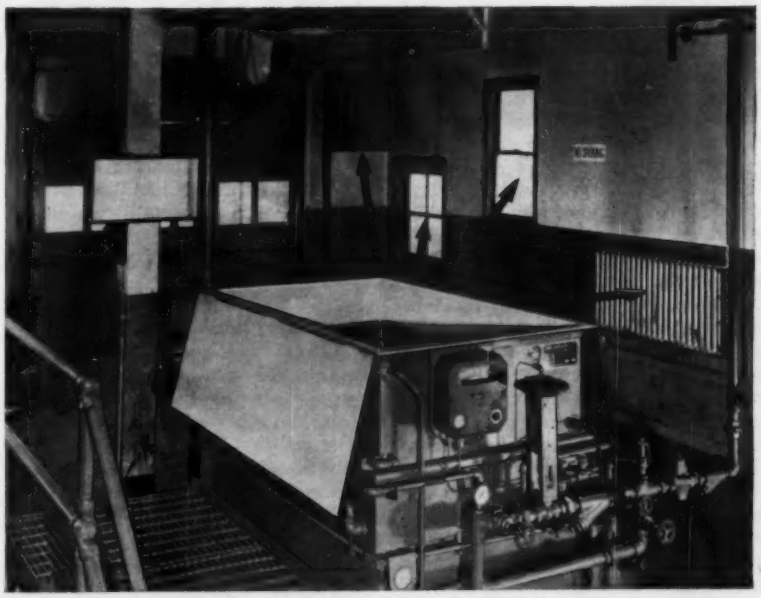
Don't pretreat with kerosene—it produces an oily vapor that settles back on the work. And kerosene's low flash point (105 F) makes it a serious fire hazard.

Cleaning cycles

Basically, vapor degreasing involves lowering the work into the hot vapor rising from boiling solvent. The relative coolness of the work causes the vapor to condense on its surface and drip back into the tank, carrying with it dissolved oil, dirt, chips, or any other matter.

Because the heat is not sufficient to vaporize the oil or other soil, they stay in the bottom of the tank and only pure clean solvent vapor ever reaches the work. When the work gets as hot as the vapor, condensation stops and the cleaning is complete. The work is then removed slowly.

A degreasing machine actually produces much more vapor than can be condensed by the work. The excess is condensed by cooling coils as fast as it reaches their level, then



Proper location of a degreaser is important for economy and safety reasons. Avoid sources of strong drafts and excessive heat as indicated by arrows. These can cause heavy solvent losses and operator discomfort

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drips back into the collecting trough. From there, the condensed solvent flows through a water separator, which removes any water that may have become mixed with it, either by condensation from the atmosphere, or by being carried in with the work.

From the separator, the solvent flows back into the tank to be heated and turned back into vapor.

This is the straight vapor cycle. It has one drawback: small, light parts (or those on which soil is particularly heavy or adherent) may heat up to vapor temperature and stop condensing before they are completely clean.

For this reason, the vapor cycle may be modified by dipping the work in boiling or warm solvent, or by a pressure spray of warm solvent.

There are three combinations of liquid and vapors in common use:

Warm liquid-vapor

The tank is divided into two parts, separated by a double wall to provide insulation. Solvent level in the warm tank is up to the top of the partition, while the solvent level in the boiling tank is much lower because of constant evaporation. Dirty condensate from the work drips back into the boiling tank, but only clean condensate from the collecting trough goes into the warm tank, then overflows into the boiling tank.

In some machines, however, the boiling tank is completely enclosed, except for a slot through which vapor rises into the main tank. Work is lowered directly into the warm solvent, and is swished about to remove most of the soil. It is then raised slowly into the vapor area and held there until condensation stops.

This cycle is often recommended for cleaning highly polished, light-gage metals which, while they appear to be clean after polishing, actually require complete destruction of surface tension before they are thoroughly clean.

This same cycle also removes low-flash solvents, or lubricants with low boiling points.

Boiling and warm liquid-vapor

When soil is particularly heavy or adherent, and especially when it contains such insoluble material as dust and metal chips, this cycle is recommended.

The main tank may have two or three compartments—the first filled with boiling solvent and deep enough so that the work can be completely immersed. Violent boiling action emulsifies and scrubs off most of the deposit.

The second compartment is deeper, contains warm solvent collected from the condenser. If three compartments are used, the third also holds boiling solvent, so as to insure an adequate supply of vapor.

The work is first dipped into the deep boiling tank, then into the warm solvent tank, where it is swished about to remove any remaining dirty solvent. This swishing also cools the work, so that vapor condenses on it when it is raised into the vapor area for the final rinse.

Choice of a two- or three-compartment system depends upon the volume of work. If loads are large, they may chill the boiling tank, thus cutting down on the amount of vapor produced, and increasing cleaning time. Then, a second boiler must maintain the vapor level, and facilitate straight-through handling of the work. If loads are small, two compartments will produce enough vapor for the job.

Vapor-warm rinse-vapor

This cycle is often used for light-gage parts which reach vapor temperature and stop condensing before they are completely clean. Work is held in the vapor zone until condensing stops, is then lowered into the warm liquid and stirred around for a few moments to help remove soil and cool down the parts, which then go back into the vapor zone for further rinse.

With some types of soil, the insoluble matter tends to bake on the surface when immersed in boiling solvent. This usually occurs when the solvent is so heavily contaminated that its boiling point is raised too high.

This is a sure indication that the tank needs cleaning, but if this can't be done right away, work may still be cleaned by omitting the boiling and substituting a vapor-warm rinse-vapor cycle. This cycle, however, may have to be repeated several times for thorough cleaning.

Spray cleaning

A spray lance, sometimes called a slush tube, is often recommended when deposits are heavy or difficult to remove, and when considerable amounts of chips or other insolubles are present.

A spray is almost mandatory, for example, when removing polishing and buffing compounds.

The spray lance is merely a length of tubing equipped with a handle and spray nozzle, connected to the warm solvent tank by a pump and a flexible hose. It is especially useful for spraying solvent into recesses and holes which are difficult to reach by simple immersion, for cleaning parts too large to be immersed in a tank of conventional size, and in operations where pockets can trap air during immersion.

The nozzle of the lance should be held well below the vapor line before the pump is switched on, then kept there during spraying. After the pump has been switched off, the lance must be allowed to drain before it is put back into the rack. And while the hose is solvent-resistant, it should not be allowed to hang inside the tank.

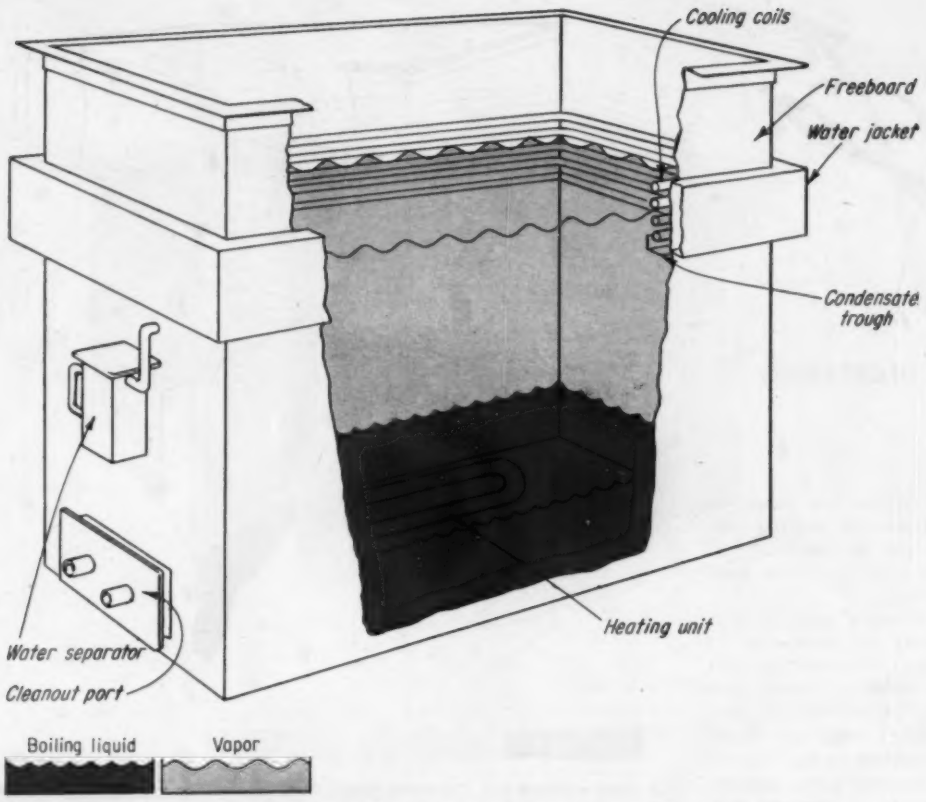
Spraying may be combined with any of the cleaning cycles previously mentioned—to produce such combinations as: vapor-spray-vapor, vapor-warm rinse, spray-vapor, boiling liquid-spray-vapor, or any other arrangement to suit the conditions.

No matter what the cleaning cycle, and whether or not a lance is used, the final step is a rinse in clean, hot vapor.

Ultrasonic cleaning

In the last several years, ultrasonic cleaning has become an accepted production operation in most modern shops. High-intensity ultrasonic waves beamed at materials immersed in liquid will clean, on a production line basis, parts so complex that they have had to be diverted from the line for costly special cleaning.

The mere presence of high-intensity sound does not necessarily produce cleaning. Cleaning actually results from cavitation in the cleaning liquid, a rather complex phenomenon involving the rapid generation and



Straight-vapor type of degreaser is used for lightly soiled work. **Vapor from** boiling solvent condenses on work and washes away soluble contaminants

violent collapse of minute bubbles. This produces countless small but intense impacts, which have the effect of thousands of rapidly moving scrub brushes at the surface of the work. These bubbles are so small that they penetrate the tiniest holes and cracks, and their sudden implosion literally blasts soil from the work surfaces.

A combination of vapor degreasing and ultrasonics has been so successful that, today, every major manufacturer of vapor degreasing equipment has an ultrasonically activated degreaser in his line.

But incorporation of ultrasonics into a standard vapor degreaser does not materially change the method of operation. The normal cleaning cycle is followed, except that in the final immersion the work is subjected to direct radiation by ultrasonic energy.

Existing degreasers are readily adaptable to ultrasonic operation. But each unit has its own conversion problems, and most ultrasonic equipment manufacturers provide engineering services to help do the job. They will, for example, supply either ceramic piezoelectric immersible transducers, or magnetostrictive transducers constructed from nickel laminations.

Some work must be oriented to the radiating face of the transducer for best cleaning results. It is thus essential that the degreaser's ultrasonic chamber be engineered for maximum efficiency. In other words, it is possible to improve cleaning by hanging transducers in a tank, but far better results are achieved if the maker's recommendations for installation are followed.

Starting the machine

A certain routine must be observed in starting up a vapor degreaser, one which must be followed every time if solvent loss is to be avoided. Details may vary with equipment supplied by different manufacturers (an instruction sheet is always provided), but the principle is the same for all.

First, the solvent level in the boiling chamber must be checked with a column gage (Correct level: 4 to 6 inches above the heating coils). The solvent return line from the storage tank must be open before the main water supply valve is opened. Individual condenser valves for the right and left sides of the jacket and coil condenser are then regulated until the return flow from each section is about the diameter of a pencil.

If the machine has been in regular operation, individual regulation may not be necessary (unless someone has monkeyed with the valves), but flow must nevertheless be checked to make sure water isn't wasted and that vapor level isn't too low.

Too small a flow, on the other hand, allows the vapor level to rise so high that the thermostat cuts off the heat supply. As the vapor level falls, the heat comes on again, causing an irregular (and inefficient) heating and cooling cycle.

When the water is running correctly, by-pass valves around the vapor-level control valve and steam trap must be checked to make sure that

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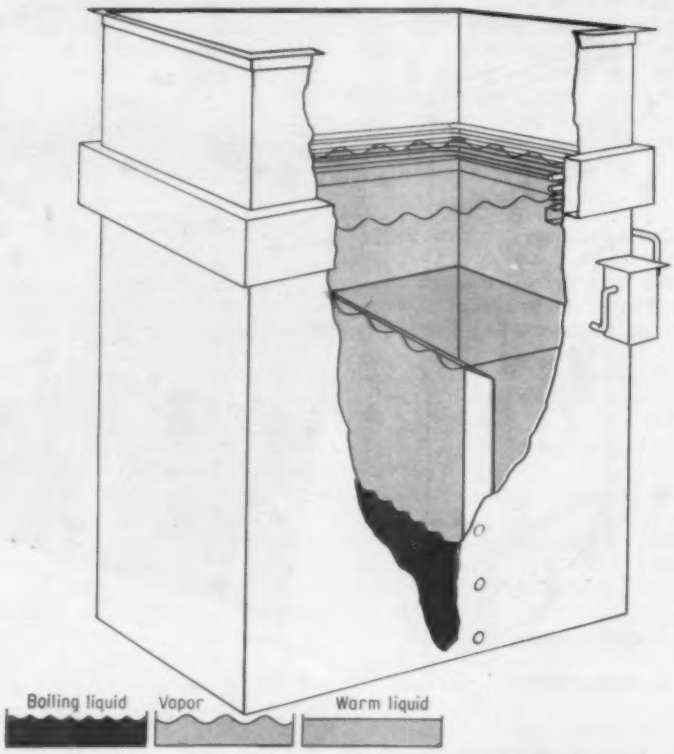
they are shut—when the steam is turned on. (If another heating medium, such as gas or electricity, is used, the unit does not have such valves.

The steam pressure gage is then checked (it must not show over 15 psi for trichlor). Pressure is controlled by a reducing valve, and should not require adjustment on a regularly operated machine. However, should pressure be too high or too low, the reducing valve may be adjusted—but only if company regulations allow the operator to do so. Otherwise, a maintenance man must be called in.

A thermostatic control on the steam valve monitors vapor level in the event that the cooling water supply fails. On some machines, this is air-operated at 25 psi—*and shop air pressure must be on.* An air filter is provided, which must be cleaned daily by opening the vent screw and blowing out accumulated water, oil, or dirt. The drain valve on the water separator must also be opened for removal of accumulated water.

Starting with cold solvent, it should take about 15 minutes for vapor to rise to mid-point of the condenser (as indicated by a wet line all around the tank). Temperature of the condensing water outlets should then be checked. These flow into an open funnel, and temperatures can be gaged by holding the hand in the water (should feel slightly warm and, with no work in the machine, should be between 90 and 120 F). If the water is too hot to the touch, water flow should be increased: if too cold, flow should be reduced. Temperature should not be allowed to drop much below 90 F, or atmospheric moisture may condense on the coils, causing rust and foggy vapor.



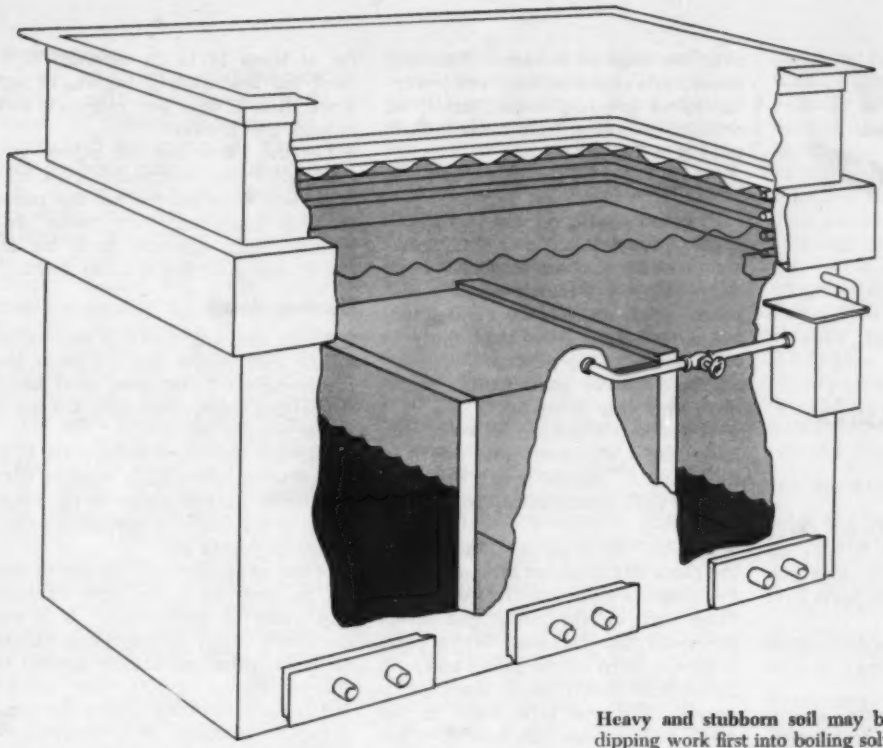
For more resistant soil, the warm liquid-vapor cycle is preferred. Work is immersed in warm solvent, then rinsed by condensing vapors

Operating a degreaser

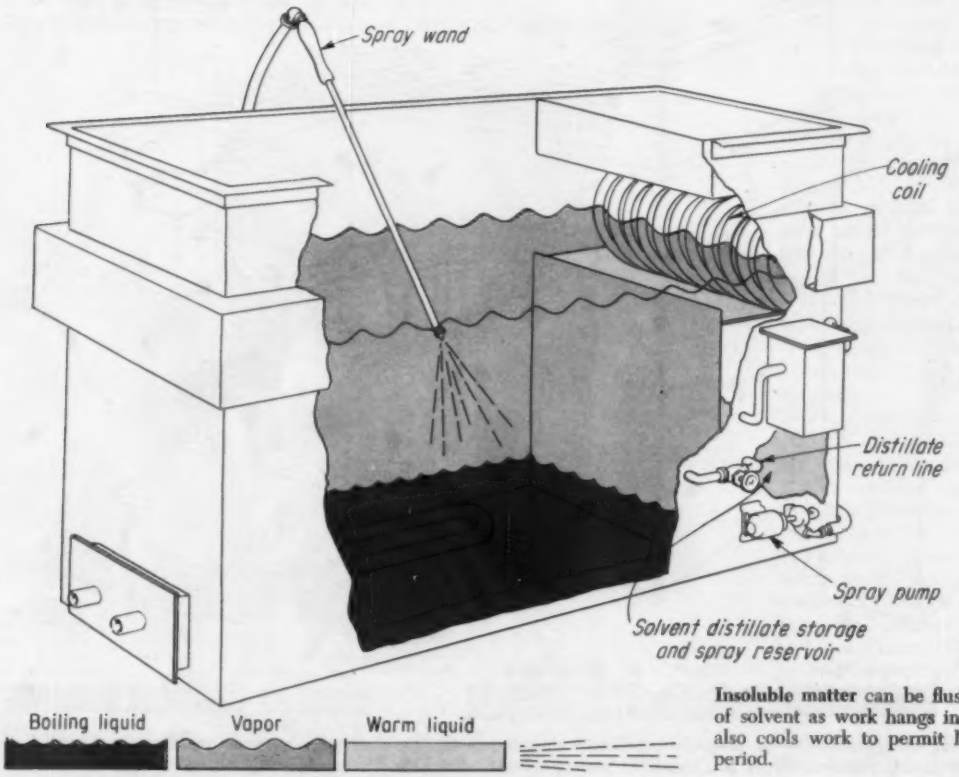
Vapor degreasers are intended for cleaning metals, and they should do just that — nothing else. They will not remove rust, scale or stains, and they certainly are not intended for cleaning the operator's dirty overalls (wouldn't do too good a cleaning job anyway).

Here are some safety precautions that must be observed:

- Don't lean over the edge of the tank. A fall into the tank could well be fatal.
- Avoid breathing the vapor. The fumes are not unpleasant, and some people get a kick from their anesthetic effect, but they can burn your eyes, and continued breathing of fumes can be harmful.
- Keep your hands out of the liquid and the vapor. Both will take the natural oils out of your skin as easily as they remove oil from metal. Your hands feel dry, will probably crack and open the way for infection.
- Wear solvent-resistant gloves, apron, and splashproof goggles—especially if handling work with a hook rather than a hoist, or when using a spray lance (in either instance it is almost impossible to avoid exposure to vapor or splashed solvent). An odd splash or two will do no harm, but if your whole hand or a large area of the body is wetted, wash immediately with warm water and plenty of soap.
- Keep the operation clean. Don't let rags, sweepings, dirt, or even half-eaten sandwiches be thrown into the degreaser.
- Don't degrease wet (with water) parts. Dry them with heat or an air blast first.
- Don't smoke around a degreaser—even if smoking is permitted elsewhere in the plant. True, solvents are not flammable at ordinary temperatures, and only moderately flammable at higher temperatures, but certain mixtures of vapor and air can be ignited by a flame. Don't think the tip of a cigarette isn't hot—it reaches well over 1000 F.
- Don't degrease near a welding torch or electric heater—this can be really dangerous.
- Hold work in a metal basket if at all possible, and place parts in it in such a way that those with deep re-



Heavy and stubborn soil may be more easily removed by dipping work first into boiling solvent, rinsing and cooling in warm solvent, then finally rinsing in hot vapor.



Insoluble matter can be flushed away by spray of solvent as work hangs in vapor zone. Spray also cools work to permit longer condensation period.

VAPOR DEGREASING

cesses drain freely and do not carry out solvent. Admittedly, it isn't always possible to do this—and you may have to move and tip parts over with a hook.

• Don't overload the basket—parts that touch each other may not be reached by the vapor.

• Lower the basket slowly, slowly, slowly (not more than 11 feet a minute at most). Otherwise, the basket acts as a plunger and pumps vapor over the edge of the tank. Specially geared power hoists for fixed lowering speed are preferable, but if an ordinary power or hand hoist is used, take it easy.

Degreasing cycle

How long parts remain in the degreaser depends on their size, material, weight, and amount of soil on them—largely a matter of judgment based upon experience. But there are a few basic rules that apply to all degreasing operations:

• Always leave parts in the vapor until they stop dripping.

• If you use a boiling or warm dip, lower the work slowly into the tank, then raise it into the vapor and hold it there until condensation (dripping) stops.

• If you use a spray lance, keep the parts in the vapor zone, and hold the nozzle well below the vapor line. Then turn on the pump and direct the spray into recesses. When parts are clean, turn off the pump and hold the nozzle down until the pipe is empty. Put the pipe back in the rack, making sure the hose does not dangle inside.

• Hold the work in the vapor zone for at least 10 to 15 seconds, then raise the load slowly (again, at not more than 11 feet per minute), and unload the basket.

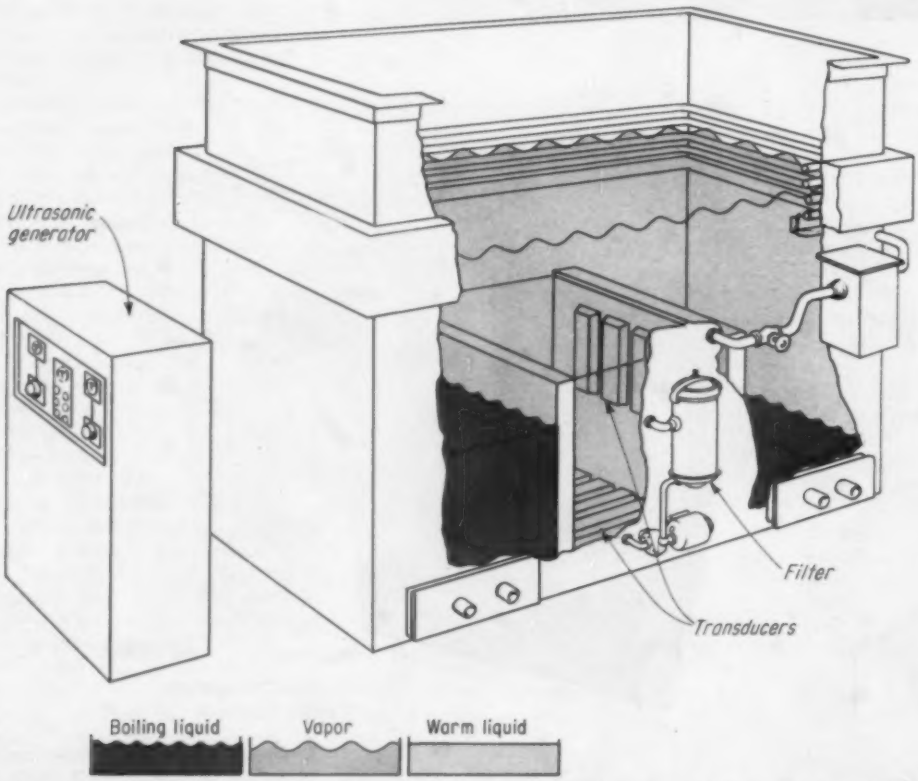
• Let the parts cool off before unloading. Parts degreased with trichlor will be a bit too hot for comfortable handling, but those degreased with perchlor will be at 250 F, can give you a nasty burn.

Shutting down

When shutting down a degreaser at the end of the day, or even for lunch, turn off the heat, wait until vaporizing stops, then close the main water supply valve.

Replace the cover slowly (if it is closed too quickly, air is pumped into the tank, pushes vapor out). Similarly, if the cover is opened too fast, vapor is pulled out.

If the degreaser will be out of use for an hour or more, turn off heat and water to save money. It is not necessary to cut off individual valves on condensers—once they are set to the basic rate of flow, they should not require resetting unless the temperature changes. But temperature *should* be checked by hand when the degreaser is started up again.



Ultrasonic energy supplied by properly positioned transducers in the warm solvent tank provides the ultimate in soil removal. Work is cleaned in boiling solvent, ultrasonically rinsed, finally rinsed in vapor

Maintenance

How often must a degreaser be cleaned out? This depends entirely upon the volume of work and the amount of soil removed. These are usually fairly constant, so that cleaning can be arranged on a regular schedule, once the frequency is established. Once every week or two is about average, although periodic checks should be made between times, especially if extra-dirty work has been coming through.

The amount of oil present in the solvent is a good indicator of need for cleaning. This can be checked either with a hydrometer or a thermometer. The former involves taking a sample and checking it, usually in a laboratory, at a fixed temperature. The latter method requires only an ordinary thermometer, frequently built into the machine. Even a hand-held thermometer will do the job.

The accompanying charts show specific gravity and temperature for boiling solvent with various percentages of oil—in other words, how much oil concentration is permissable in boiling solvent before the tank must be cleaned and the solvent redistilled. For example, when the temperature of trichlor is at 195 F, or perchlor 260 F, oil concentration is 30% and solvent redistillation and tank cleaning is indicated.

In regular operation, clean distillate becomes progressively more contaminated as it automatically returns to the boiling tank. Thus, when distilling for cleanout, it is necessary to close the valve between the storage and boiling tanks, so that all the distillate remains in the storage tank.

If there is no storage tank, the distillate must be run from the collecting trough, or pumped out of the clean sump through the spray lance, and stored in clean solvent drums or other clean containers.

When the level of the solvent in the boiling tank gets down to about 1½ inches above the top of the steam coils or other heating unit, heat must be turned off. The pilot must also be turned off on gas-heated units.

However, if vapor stops rising before the 1½ inches-above-the-heating-unit level is reached, most of the solvent has been recovered and heat must be turned off at once. This is particularly important with electric and gas-heated units— oil could heat up to its flash point and cause a fire. Safety thermostats should prevent this, but it is always possible that they are not operating properly.

If vapor is still rising when the minimum level is reached, heat must be turned off and the remaining oil and solvent mixture run off into a container—to be saved and added to the tank during the next cleanout. This saves a considerable amount of solvent.

After distillation has stopped, residue is allowed to cool and is run off through a drain. This residue, incidentally, should not be touched. The heating unit and the bottom of the tank will usually be covered with a thick layer of "glop," which must be removed by taking off the cleanout door (to which the heater is usually attached) and scraping out the residue with a hoe. Coils must be scraped with a putty knife and wiped clean, and residue must also be cleaned from the thermostat bulb. When time is important, it is a good idea to keep a spare heating element on hand which can be installed quickly. Then the dirty one can be cleaned when convenient.

No smoking

Don't smoke during cleanout. Heavy solvent vapors lie close to the floor, where cleanout is done. Even if a portable blower chases fumes away, there is always danger of decomposition when vapors hit a hot cigarette end.

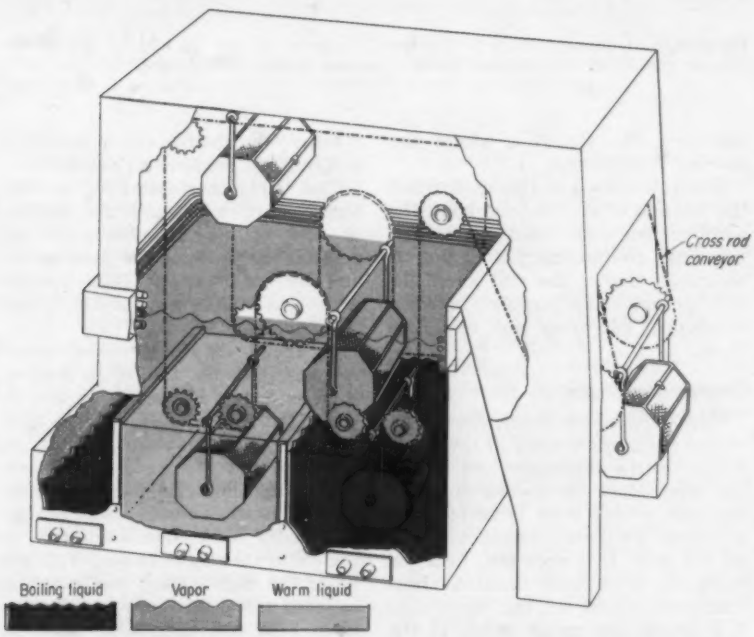
It takes about half an hour to distill off all the solvent in the average machine, during which time checks should be made for leaks in solvent, water, and steam lines. Pipe connections, valves, gage-glass fittings, and pump packing should be checked, too. Leaks around the tank, incidentally, usually show up as streaks or paint peeling.

Don't get inside the degreaser tank unless the reason is urgent—and then only after ventilating it thoroughly for four hours, or one hour or more under forced air. Even then, a second man should stand by with a safety line. A mask should be worn, one with a canister suitable to the solvent in use. Such canisters are only good for about half an hour, and then only when there is enough air in the tank for breathing.

If vapor concentration is heavy, a breathing apparatus with air cylinders or an air line should be used. In any cases, gas-tight goggles should be worn.

If the solvent should "go acid" (a pH less than 4.5), a thorough cleaning is needed to get the entire inside of the machine into shape. Regular cleaning procedure should be followed. Then the cleanout door should be replaced, the machine filled with water to its normal liquid level, 2 ounces of soda ash added per gallon of water, and the water boiled for half an hour. (Never use caustic soda—it could react with trichlor to form an explosive mixture.)

Sides and bottom of the machine should be cleaned with a long-handled brush, the water emptied out,



Bulk cleaning of small parts may be handled in perforated baskets attached to a cross-rod conveyor. Any desired cycle may be specified

VAPOR DEGREASING

and the tank rinsed thoroughly with a hose, and dried out. The water separator should also be opened up and cleaned out.

During cleanout, check the tank itself for rust spots and leaks. If welding must be done, remember that it destroys galvanized coating, so the weld must be covered with anticorrosive material. Check conveyor equipment, pump and gage-glass packings, all fittings, joints and couplings. Also check liquid-level gages, solvent temperature indicators, pressure gages and similar control equipment by comparing them with gages of known accuracy.

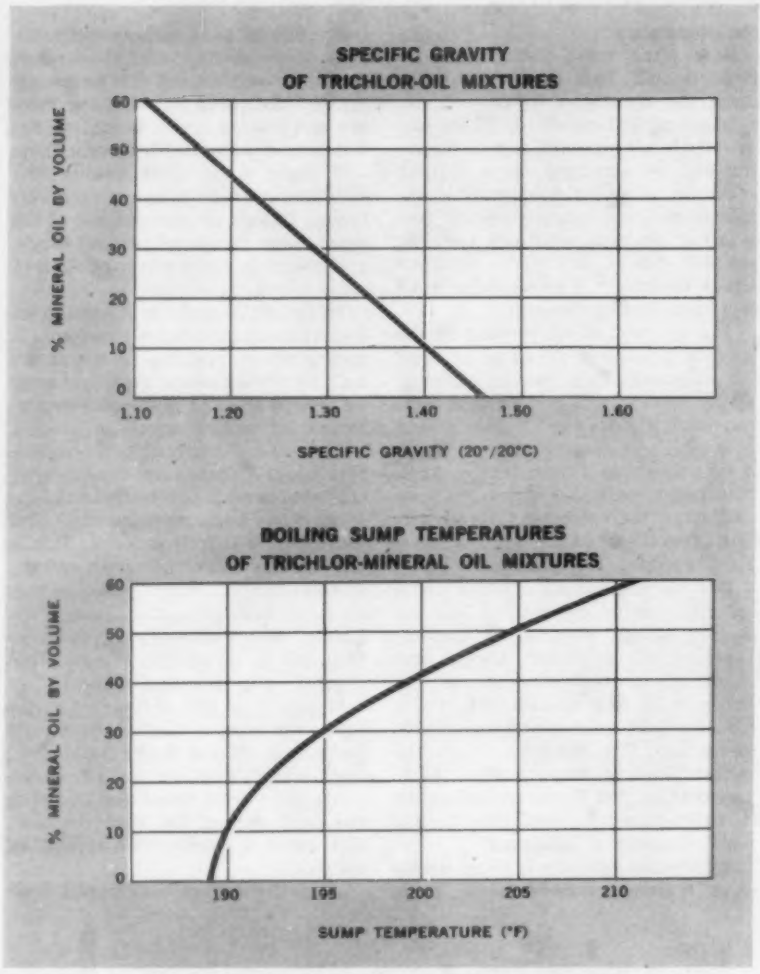
After cleaning

After every cleanout, check the cleanout door gasket. If it is torn or blistered, it should be replaced with a new one (a lot of solvent can be lost in trying to save a 50¢ gasket). Gasket should be stuck to the door with shellac, and the door opening coated with non-hardening pipe compound. Hold-down nuts should be tightened evenly all the way around. The drain valve seat should then be checked for chips or other matter that might prevent it from closing properly.

After everything has been tightened and checked, open the valve from the storage tank, letting the solvent run back into the boiling tank. Fresh solvent may then be added as needed, through the filler hole in the storage tank, bringing the level up to normal operating position. This should be done while the tank is cold—adding cold solvent to hot may cause it to vaporize too fast.

If time cannot be taken for regular cleanouts, a separate still may be employed, in which case the entire contents of the degreaser are pumped into a tank truck, and fresh solvent pumped in. The truck is then unloaded into the still, where the solvent is recovered.

Separate stills are also used when the volume of oil removed from the work causes such rapid contamination that continuous purification is desirable. Use of the still lengthens the period considerably between cleanouts, but does not eliminate them.



Percentage of contamination of trichlorethylene by oil can be told by testing for specific gravity or by checking the temperature of the boiling sump

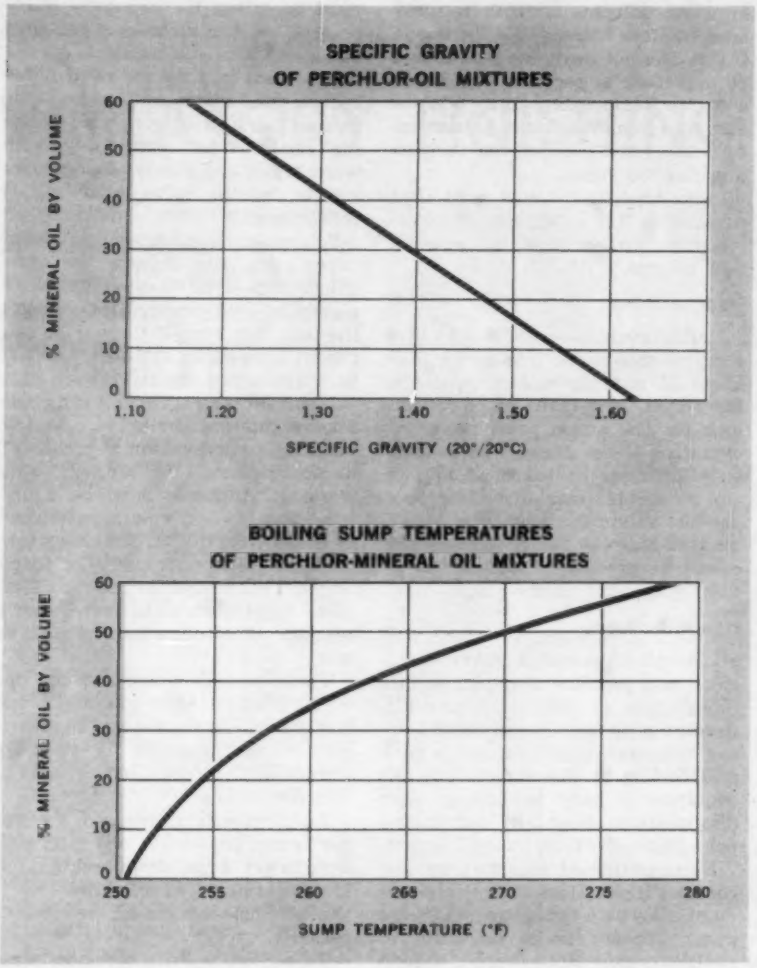
Checking controls

Check the vapor-level thermostat once a week by shutting off the water supply to the condenser and letting the vapor level rise around the bulb. As soon as the bulb is surrounded by vapor, the instrument should shut off the heat. If it does not, turn the adjusting knob back until the heat shuts off. Then set the thermostat 5 F below the cutoff point. If the heater does not cut off, even when the minimum setting of 150 F is reached, the instrument is defective and must be repaired or replaced.

The safety thermostat for solvent temperature, which is at the bottom of the boiling chamber, can be checked only when the machine is emptied for cleanout. It is usually set to cut off the heat at 220 to 230 F for trichlor.

To check, turn on the heat when the tank is empty, and let the heating surface temperature rise to 250 F, when the heat should cut off. If it does not, the instrument must be removed and repaired or replaced. When this check is made with an electric heater, power must not be left on for more than 2 minutes, or the elements may burn out. With gas heat, the flame must not play on exposed metal for more than 2 minutes. This test cannot be used on plastic-lined degreasers.

Some degreasers are equipped with



For perchlorethylene, these charts may be used to indicate the percentage of contamination by oils, by either hydrometer or thermometer readings

a controller for the outlet temperature of the condenser water. Accuracy of this controller should be checked once a week while the machine is running. (Temperature at which control is set should be compared with a thermometer reading. If the two do not match, adjustment on the control should be changed until it holds the temperature between 95 and 105 F.)

Trouble shooting

As with any piece of equipment, degreaser troubles can usually be traced to faulty installation, lack of care, or improper operation. One of the most common complaints is a strong smell of solvent in the working area, which could be dangerous to the operator and to those working nearby. There are a dozen reasons why this happens and a dozen remedies (given in parentheses):

- Failure to turn on the water before turning on the heat. (This shouldn't happen if the thermostat is working properly — check it.) Water supply failure or pressure drop could also be responsible.
- Solvent is overheated. (Steam pressure is too high, check thermostat in boiling tank.)
- Work has been loaded or unloaded too quickly, forcing vapor out of tank. (Speed of hoist should never exceed 11 fpm.)
- Strong drafts over the tank. (Machine is too close to an open window or fan. It may be necessary to install baffles or screens to stop the draft.)
- Parts are improperly racked. (Rack the work so that it drains freely, does not drag solvent out of the tank.)
- Spraying is being done above the vapor level. (Keep the nozzle well below the vapor line.)
- Excess water in the machine — recognizable by cloudlike ghost vapors around the cooling coils. (The water may come from leaks in the coils, from reversed circulation in the coils, from sweating of the coils in humid weather, as a carryover from soluble-oil cutting fluid or wet work, or from putting in so heavy a load that the vapor level drops. Keep the condensate trough clean so as much condensate as possible can flow to the water separator.)
- Too-infrequent cleaning of the machine. (Keep a closer check on the degree of solvent contamination.)
- Work baskets are too big. (A basket that fits too closely to the tank walls acts as a piston, pumping vapor out during immersion and withdrawal.)
- Overloading. (Too big a load condenses the vapor faster than the boiler can produce it—lowering the vapor level and pulling air into the machine. When the work heats up and the vapor level rises again, the air-vapor mixture is pushed out.)
- Cleaning cycle is too short. Removing work before condensation stops brings solvent-wet parts into the work area, where the solvent evaporates. (Hold the work in the freeboard area, above the vapor, for a few seconds to make sure it is dry.)
- Tanks or lines are leaking. (Repair immediately. Check all connections, glands, pumps, etc.)

High solvent consumption

There is no way to establish just how much solvent should be consumed per day or per pound of work. Just too many factors are involved: type and amount of soil; size, type and design of work; seasonable variations in evaporation rate; location of the degreaser; and operator care and efficiency.

However, if solvent losses seem higher than expected, or if they increase for no apparent reason, it is possible to cut them down by watching these points:

- Can you smell solvent? If so, vapor is escaping from the machine. Track down the smell by any of the clues mentioned earlier.
- Has the heat been left on when the machine isn't operating?
- Has the cover been left off?
- Has distillation been incomplete during cleanout?
- Have clothes or other absorbent materials been cleaned in the machine?

Corrosion

Tank corrosion can be serious. It generally appears first on the walls

VAPOR DEGREASING

around the cooling coils and condensate trough, and must be checked immediately.

Corrosion is generally caused by the continued presence of water in the area and, if low in the tank, by solvent decomposition. This decomposition may spring from localized overheating, excessive oil content, which raises the boiling point, or simply by poor housekeeping—allowing contaminants to accumulate and act as a catalyst.

Corrosion can be prevented by frequent checking of temperature controls (to prevent excessive heater temperature), by frequent and thorough cleaning of the unit, by periodically adding fresh solvent so as to maintain stability, and by making sure that the water separator doesn't load up with water.

Staining and rusting

Stains occasionally appear on degreased work and cannot be removed by degreasing. They usually occur on heavily contaminated light-gage metals, which heat up to vapor temperature before cleaning is complete. The heat then tends to bake the oil, changing its properties and making it insoluble.

This can be remedied by removing most of the oil (by dipping the part in warm solvent, or with a spray lance) before holding it in the vapor. If this does not work, the part should be degreased in perchlor, which has a higher temperature than trichlor and thus removes more grease before the work reaches the temperature of the vapor.

If the work shows rust spots after degreasing, it is a sure sign of excess moisture in the tank, or possibly acid solvent.

Slow starting

Under average conditions, a degreaser should be ready for use about 15 minutes after the heat is turned on. If it takes much longer, look for low steam pressure or inoperative steam traps, blown fuses on electrically heated machines; or (on gas-heated machines) improper gas-air mixture, poor flue draft, plugged holes, or faulty joints. If the condition persists, install a downdraft eliminator on the stack.

Health hazards

Like all chlorinated solvents, trichlor and perchlor are toxic — although less so than most solvents. Breathing the vapors can cause nausea, dizziness, headache, and a general feeling of discomfort. But the condition is only temporary, soon disappears in fresh air, and has no permanent effects on internal organs.

Even continued exposure to low concentrations (less than the maximum allowable concentration of 220 ppm) appears to do no harm to healthy organs. But exposure to high concentration can be harmful and must be avoided. Severe overexposure may result in vomiting, unconsciousness, even death.

If someone is overcome by fumes, get him into fresh air and call a doctor. If breathing has stopped, use artificial respiration and wrap him in blankets to avoid shock. If clothing is wet with solvent, take it off and apply olive oil or lanolin to the skin. *Even if the patient is conscious, don't let him exert himself. Don't let him walk to the hospital, and do not let him drive himself.*

As soon as the patient gets home, he must go to bed, and the doctor must be called. He may have coffee or tea, but no alcholic stimulants, and above all, no adrenalin.

If solvent gets on the skin, it becomes dry, rough and red as the natural skin oils are removed, cracking easily. Wash thoroughly with warm water and plenty of soap, then rub in lanolin, salve, olive oil or cold cream.

Solvent or strong concentrations of vapor sting and inflame the eyes, which should be washed out with plenty of cold water. This relieves the pain, but even if there is no apparent damage, an eye doctor should be consulted.

If solvent is swallowed it can cause severe internal irritation, nausea, vomiting, diarrhea and (probably) unconsciousness as kidneys stop working. A doctor must be called immediately, and vomiting induced by tickling the throat, drinking warm mustard water, salt water, or soapy water. This should be taken at least three times, then be followed with a teaspoon of epsom salts in a glass of water.

These hazards exist, and the operator must be made aware of them. But they don't present any real danger if the operator is properly trained and is provided with protective clothing.

As previously mentioned, the vapor is not unpleasant and it is possible to get "high" from breathing it. If an operator does so, switch him to another job—before he becomes a casualty.

To repeat, a little common sense and attention to routine safety precautions can go a long way toward eliminating the hazards and difficulties of degreasing. Required safety precautions are no more complex than those for any hot, volatile liquids, and troubles can be avoided by following instructions of the manufacturers of the machine and solvent, and by maintaining good housekeeping.

To put it in a nutshell, degreasing is neither difficult nor dangerous if properly handled. On the contrary, it is one of the simplest, most effective and least expensive methods of cleaning metal. •

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For parts with hard-to-get-at recesses

VIBRATORY FINISHING

Rotary and vibratory motion are now combined to produce a "waterfall" effect which reduces deburring and polishing time, saves on compounds and cuts direct labor costs

By A A Polucha,
Southwestern Engineering Co,
Los Angeles

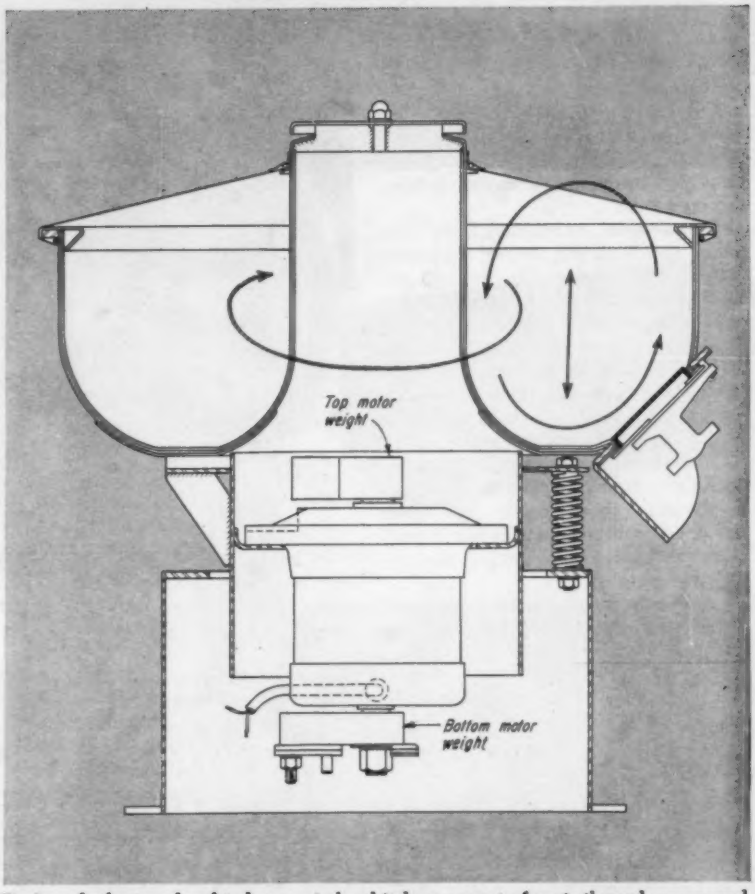
Vibration, that traditional enemy of the precision machinist, does have its uses, too. One is as a fast, efficient tool for finishing metals and other materials.

Put to use in a vibratory finishing machine, it works this way: Parts are immersed in abrasive compounds, which are vibrated—generating a scrubbing action which removes burrs, or rounds off sharp edges. High surface finishes can be attained with polishing or honing media.

Vibration causes the parts to work their way through the media, which deburrs and polishes hard-to-get-to openings, slots, grooves and other recesses, and rounds sharp edges.

Ideally, parts to be deburred should be free of all dirt, oil, or other foreign matter. But because some contamination is almost always present, cleaning compounds are usually added to the abrasive. This not only cleans the work during deburring, but prevents glazing of the abrasive.

Deburring compounds usually contain, also, fine aluminum oxide or silicon carbide grit, which coat the chips in the media, thus promoting faster cutting action.



Design of vibratory bowl induces spiral, orbital movement of parts through compound and abrasive media. Short-stroke scrubbing action prevents damage to delicate parts. Vibration amplitude may be varied by adjusting weights on motor shaft

Media Size is Important

In deburring cast iron or hardened steel with an initial surface finish of 75 micro-in. or higher, aluminum-oxide media should contain chips about ⅜ in. in diameter. This not only removes burrs efficiently, but also improves surface finish by as much as 50% in a five-hour run. As surface finish requirements become more exacting, smaller abrasive is used, or polishing media may be required.

Aluminum and other nonferrous alloys are also deburred most efficiently by larger chips. However, because of the softness of the metal, surface finish deteriorates and it is usually necessary to make a compromise between chip size and time cycle to maintain or improve the original finish.

For deburring hard metals in general, the larger the chip the faster the cut and the faster the improvement in surface finish. Smaller chips prolong the deburring cycle but provide better finishes. Random-shaped chips are usually used on parts that have liberal tolerances and where lodgement is no problem. Synthetic abrasives are preferred where tolerances are close and where recesses or grooves tend to trap chips.

Coloring (improving the reflectivity of the metal) usually requires a second operation and, for this, composition of the abrasive compound is important, and well-worn or glazed media are preferable. Sometimes, deburring and coloring can be combined by using conventional deburring media with an extra amount of burnishing compound and a higher-than-usual water level. The processing cycle will be longer than for either deburring or coloring, but much shorter than that required for two separate operations. The two-stage process, however, results in superior coloring.

Ceramic and plastic parts can also be processed efficiently, although cy-

cles run three to four times as long as for metals. Moisture absorption, chipping specifications, hardness, and chemical composition must be taken into consideration in setting up deburring or polishing procedures.

One basic vibratory finishing machine, a horizontal spring-mounted barrel, rotates slowly to provide a sliding action and keep the mass thoroughly mixed and working at all times. Vibration is usually produced by eccentrics at each end. The scrubbing action is faster and more efficient than the simpler sliding action provided by ordinary tumbling barrel operation.

Tub-shaped containers, on the other hand, do not rotate; vibratory forces alone produce the required action and movement of the mass. Several methods of developing vibratory forces for spring-mounted, tub-shaped containers include: eccentric weights at each end; eccentric shafts; eccentric weights at each end of a motor suspended from (and parallel to) the bottom of a tub, and electromagnetic force.

Variable speed drives are often used, and vibration amplitude is usually controlled by varying the eccentric weights.

A third type of vibratory finisher, the recently developed Sweco Vibro-Energy Finishing Mill, is radically different—is bowl-shaped, with a vertical centerpost, and is supported on a circle of 12 or more springs.

Vibration is generated in both vertical and horizontal planes by the action of two eccentric weights—one on each end of a motor mounted vertically under the centerpost. The lower weight is adjustable through 100° in relation to the upper weight for varying the rate of movement of the mass in the container.

Multiple-path movement

Parts and media follow three paths of movement. In addition to the up-and-down motion developed by vibration, and the rotary movement around the centerpost, the mass also cascades in a waterfall motion toward the center. Thus, a spiral orbital motion is imparted to the working mass.

Finishing time cycles run as little as one-third of those required with conventional barrels, and the equipment can handle parts that cannot be processed in barrels. Moreover, because the mass is constantly agitated, compounds saponify much faster than they do in barrels—so considerably less compound is needed than with other equipment.

Waterfall effect produced by combined vertical and orbital action is clearly visible. Open bowl design permits the operator to observe progress by use of a strobe light without stopping the machine

In long runs, it is better to flush the machine and add new compounds two or three times during the run than to start out with a heavy concentration. Usually one-third to one-half the compound used for conventional barrel finishing is sufficient.

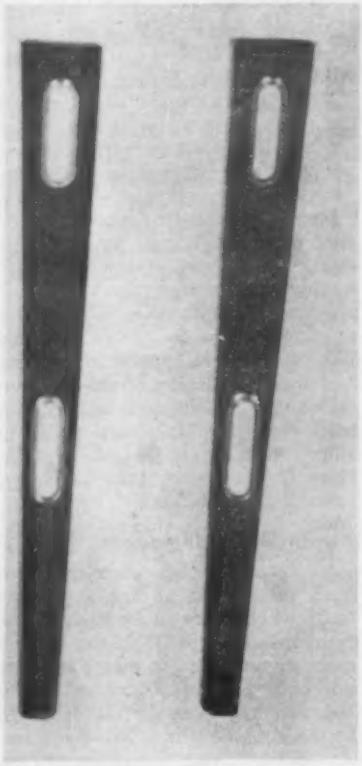
However, a damping effect can be obtained by adding quantities of water, which provide to some extent the effect of a variable-speed drive as well as that of an amplitude governor. The addition of water is often advisable in processing delicate parts, so as to move them more slowly through the mass.

Keep the bowl full

On the other hand, maximum efficiency is obtained by filling the bowl to or near capacity with media (abrasive and compound). Even when only a few parts are being processed, the bowl should be filled with media to at least 70% capacity.

Adequate amounts of water (for compound saponification), combined with proper compounds, can achieve a coloring and burnishing effect comparable to that of ball burnishing.

Open construction prevents pressure buildup, so that acid or high-alkaline compounds can be used. Rubber gloves and other precautions must be used to protect operators and, when corrosive compounds are used, a fabric cover can be installed to protect the operator. •



Aluminum struts immediately following machining operations (left) showed burrs in holes, and poor surface quality. After vibratory finishing (right) holes are clean and surfaces are free of blemishes

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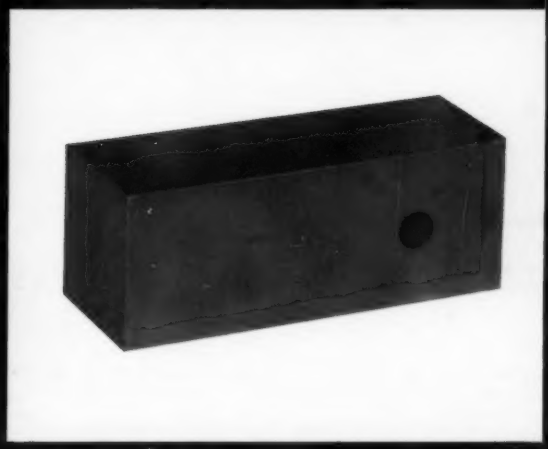

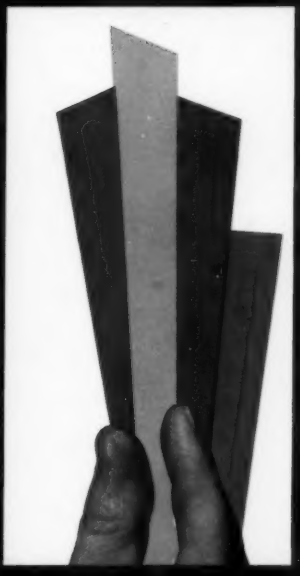

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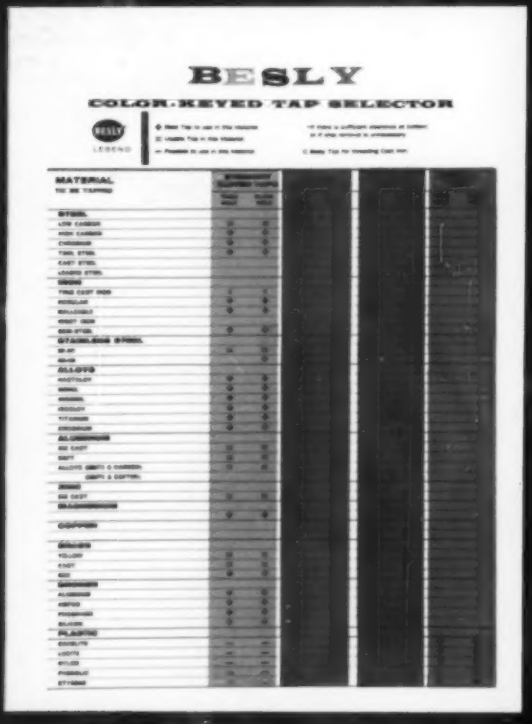
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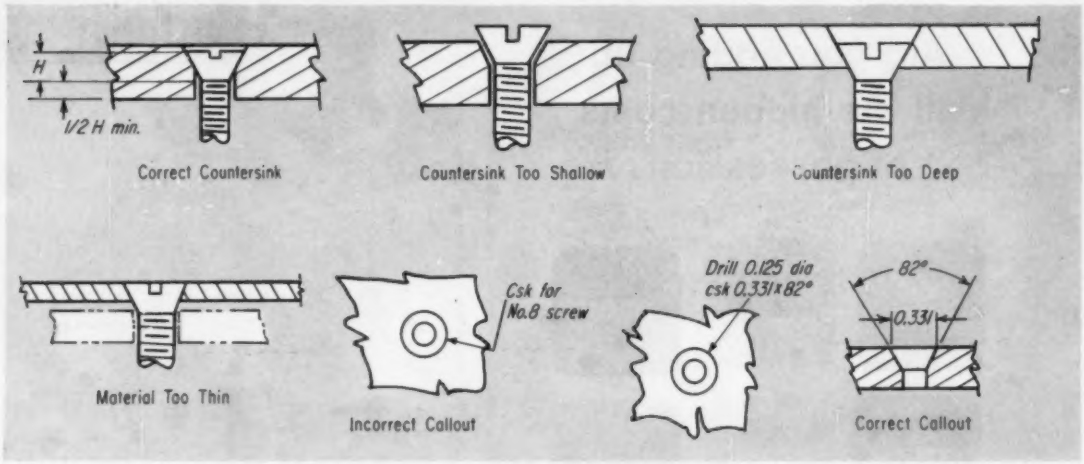
Countersunk Holes for Screws

By Frank W Wood, Jr, Advanced Designs, Inc, Vienna, Virginia



Rework for the shop and embarrassment for the engineering department are created by failure to specify correctly the dimensions of a countersunk hole for a flat-head machine screw. Basic problems created are:

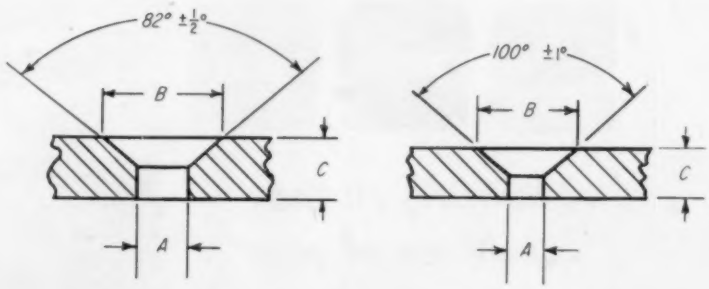
1. Using a flat-head screw in material that is too thin. The protruding bottom of the screw head interferes with mating of the two materials being fastened.

2. Countersunk holes that are too deep or too shallow require further fitting or scrapping the parts.

With either 82° or 100° flat-head screws, the minimum material thickness should be 1½ times the height of the screw head. Dimension *C* in the table is calculated on this basis, plus an allowance that puts the top of the head below the material surface. If the material is too thin for the 82° head, you may be able to employ the 100° head.

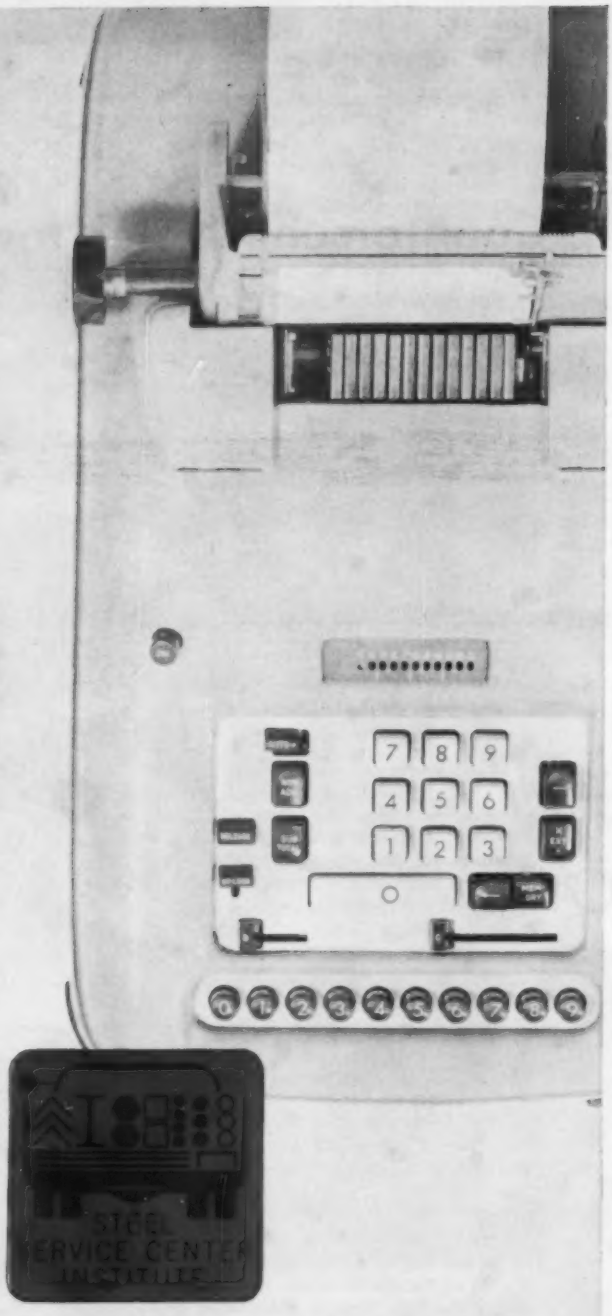
Proper callout on the drawing is essential. Do not merely ask for a No. 8 screw. Show the clearance drill size from table, the head angle, and the diameter of the countersunk hole. This diameter is slightly larger than for a screw head with sharp corner, so that it will not be flush.

Screw Countersink Hole Dimensions



Screw Size	Clearance Hole *A*		Countersink Dia *B* +0.020 −0.000		Min. Material Thickness *C*	
	Dia	No	82° Head	100° Head	82° Head	100° Head
2	0.093	#42	0.177	—	0.077	—
4	0.120	#31	0.230	0.234	0.101	0.078
6	0.144	#27	0.284	0.296	0.125	0.093
8	0.173	#17	0.331	0.343	0.150	0.109
10	0.199	# 8	0.390	0.390	0.174	0.125
1/4	0.257	F	0.512	0.515	0.230	0.171
5/16	0.323	P	0.640	0.640	0.287	0.218
3/8	0.386	W	0.767	0.781	0.335	0.250
7/16	0.453	29/64	0.817	—	0.345	—
1/2	0.515	33/64	0.880	—	0.390	—

Are you adding up all the hidden costs of possession . . .



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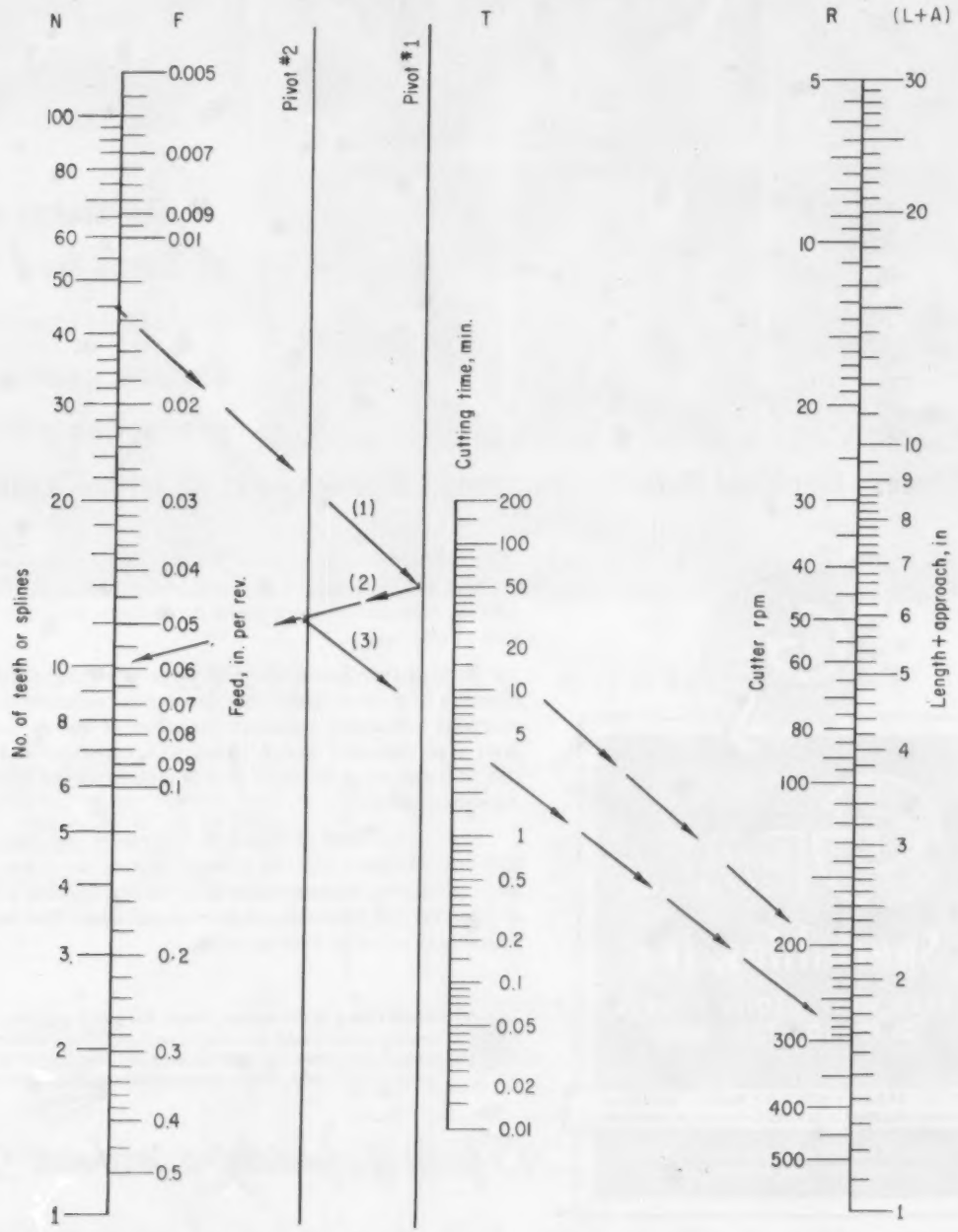
Time to Hob Gears and Splines

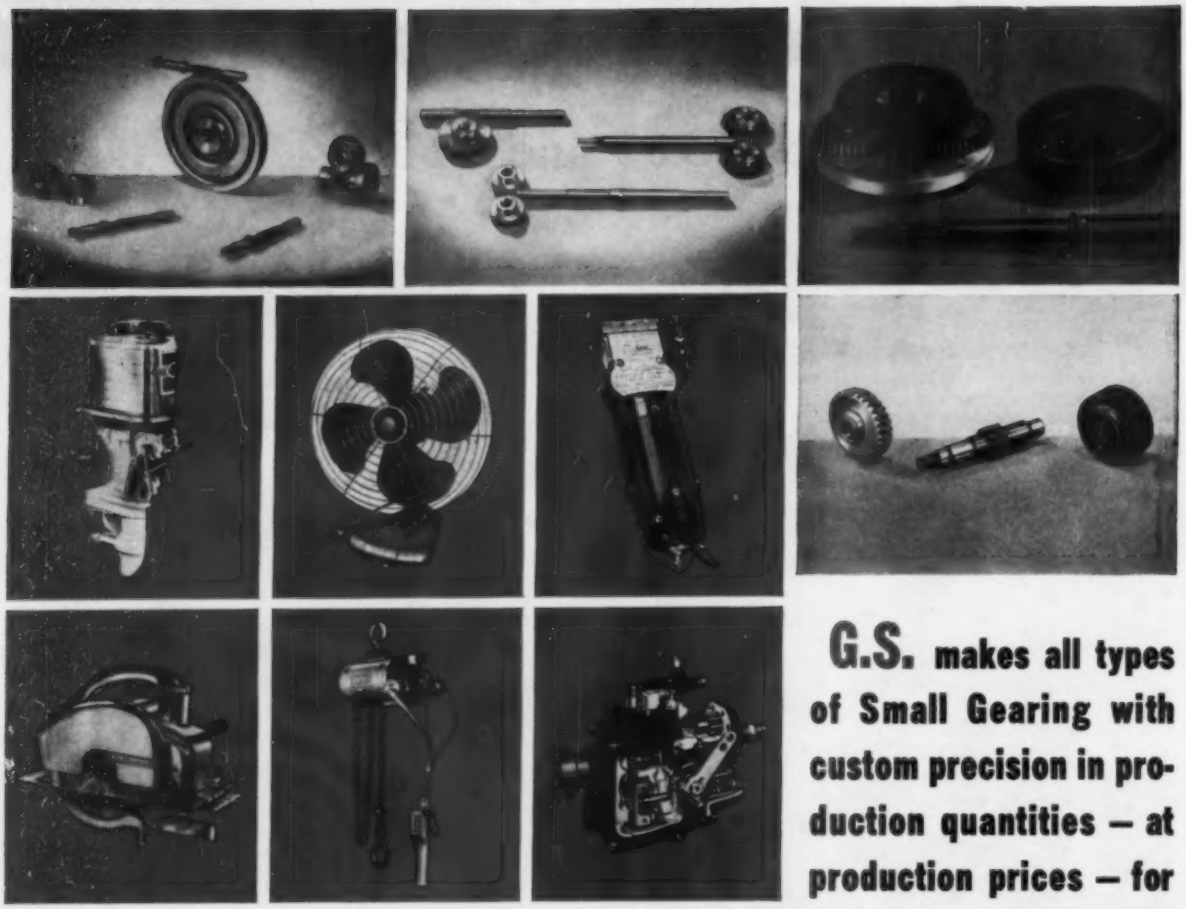
Tyler G Hicks

Gear and spline hobbing time is given by:

$$T = \frac{N\,(L + A)}{F\,R}$$

where T = cutting time in minutes; N = number of spur teeth or splines; L = face of gear spline length, in.; A = approach of cutter; F = feed of cutter, ipm; and R = hob speed, rpm. $A = \sqrt{d\ (D\text{-}d)}$, where D = dia of hob, and d = whole depth of gear tooth. Therefore, it is necessary to calculate A. By following the three construction lines 1, 2 and 3, you will see that T = 5 min., for this problem: number of teeth N = 45, face width L = 1.2, R = 300, F = 0.06 in. per hob rev., and A = 0.8 in.





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45 Years of Specializing in Small Gearing!

which drill really costs less?

Based on results, drills "A" and "B" (center and right, above) should cost 43% and 39% less than W & B drills (left, above)—instead, they can be purchased at *only* about 20% less.

Watch those *initial* costs—they may be *costly!*

COMPARATIVE DRILLING PERFORMANCE

General Purpose Jobbers Drills	*No. of holes per drill size					Total No. of Holes	Efficiency Rating
	#40	#30	3/16"	1/4"	3/8"		
W & B Drills	208	62	57	50	34	411	100%
"A" Drills	142	24	14	28	28	236	57%
"B" Drills	114	49	13	61	15	252	61%
Thickness of plate	1/32"	3/64"	1/2"	1"	1"	Material: Heat treated chrome nickel steel	

**In each drill size, five drills of each brand were tested and each drill was resharpened three times as required.*

Many drill performance tests similar to this one have been made. However, W & B will gladly conduct drill tests at *your* plant and under *your* conditions. Contact us direct or through your W & B distributor. He can offer this service plus fast delivery from complete stocks.

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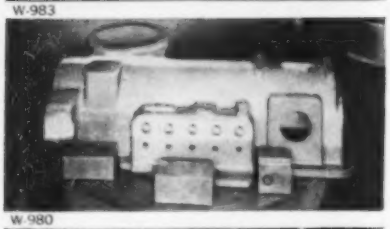
W-983



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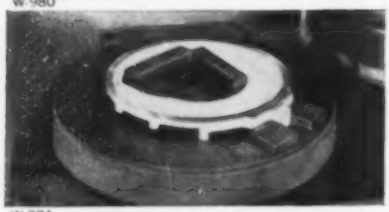

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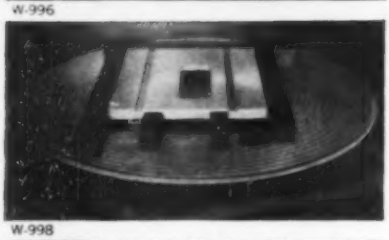
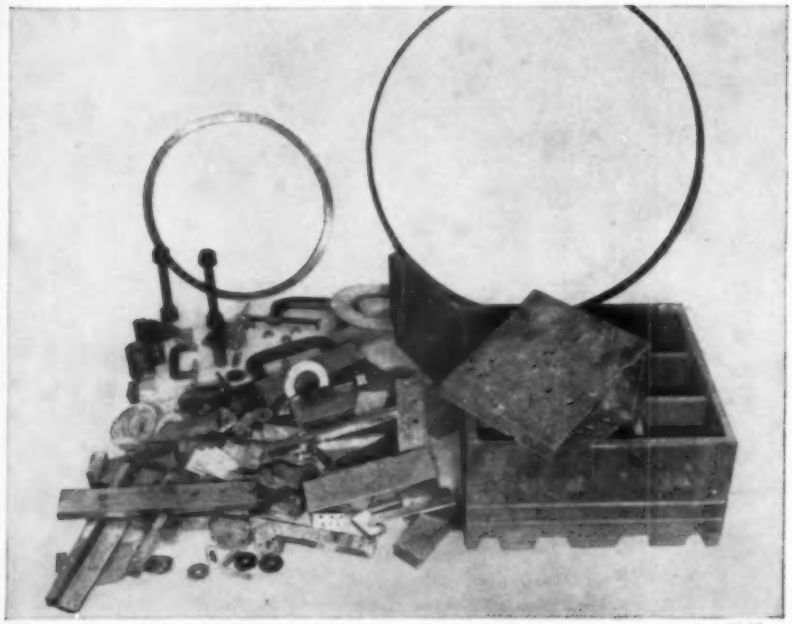
W-734

W-996



W-998

BLANCHARD GRINDERS



M-59

Use Industry's Least Expensive Fixtures . . .

Normally, the Blanchard magnetic chuck will hold ferrous work pieces during the grinding cycle.

But when fixtures *are* needed — for holding irregular-shaped objects, whether ferrous or non-ferrous — you can usually select your "fixtures" from the nearest scrap pile.

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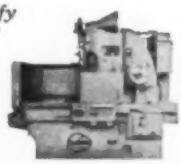
Write today for your free copy of "Work Done on the Blanchard", Fifth Edition, and "The Art of Blanchard Surface Grinding", Fourth Edition.

For Best Results, Always Specify Blanchard Grinding Wheels for Blanchard Grinders.



No. 18

PUT IT ON THE BLANCHARD **THE BLANCHARD MACHINE COMPANY**

64 State Street, Cambridge 39, Massachusetts

Talking Shop

Those Magnetic Fields

MAGNETISM IS TURNING up in the strangest places. First we reported it could be used in heat treating, then to form metal. It has been a standard inspection method for years.

Now we hear that Avco is making progress in generating electricity without generators. The long-known method, taken from magnetohydrodynamics, involves passing gas at high temperature through a magnetic field to generate electric current. Avco has already generated 205 kilowatts for 10 sec, is stepping up its work, may soon be building larger units.

Any day now we expect to hear of another application of magnetism. And we're frantically reviewing our physics text.

Small Plug

WE ARE AS FED UP with all the special "weeks" there are in the year as anyone, but there is a "week" coming up this month that deserves more attention than most. It is called "National Library Week" and we want to take the occasion to ask you if your company has a library and if you use it. If you have, and do, you know it is one of the most valuable assets you have and a good place to start looking when you have a problem.

And if you don't have a company library, you might be amazed at how helpful the local public library can be. There's a lot of knowledge inside those walls, and if you aren't taking advantage, why not do a little investigating this month. If you don't hit National Library Week when you make your visit, we'll bet the librarian won't mind.

Goodbye, Gun Plant

THE NAVY GUN PLANT in Washington, hard by the bridge over which John Wilkes Booth escaped on that April night in 1865, is a metalworking plant remembered warmly by many. Almost as old as the Republic, the plant has produced the big guns for the Navy for as long as any of us can remember. The plant reached its peak in World War II, when nearly 25,000 worked there.

Now comes word that, outmoded by the missile, the plant will close by the end of the year. No more big guns of the old type. But the plant will go on—converted to offices. No doubt they will be classed as temporary. And in that capacity the plant is likely to see a good many years yet.

Large Bouquet

WE MUST THANK the editor of *The Nation* for a flattering comment in the March 25 issue of that publication. Reviewing the recent flap over the export of grinders to Russia, that publication quoted our editorial by Burnham Finney and introduced it thusly: "In its March 20th issue, AMERICAN MACHINIST/METALWORKING MANUFACTURING, which probably knows more about machine tools than the Defense Department, the Commerce Department, the House of Representatives and the Senate all put together, refers to the episode . . ."

Where Ideas Come From

"MANUFACTURING RESEARCH is destined to take its place, along with basic research and engineering development, in shaping the products and factories of tomorrow." So said H H Bixler of General Electric at the recent SAE National Production Meeting.

As examples of the increased emphasis, Bixler cited the new Western Electric manufacturing research center being built near Princeton, NJ, and the GE manufacturing lab ($4 million) now going up in Schenectady.

The substantial amount of new manufacturing technology presents a complex problem. Any one laboratory, even in a large company, can develop only a small part of it—probably less than 1%. Thus, 99 out of every 100 good ideas are outside any given company!

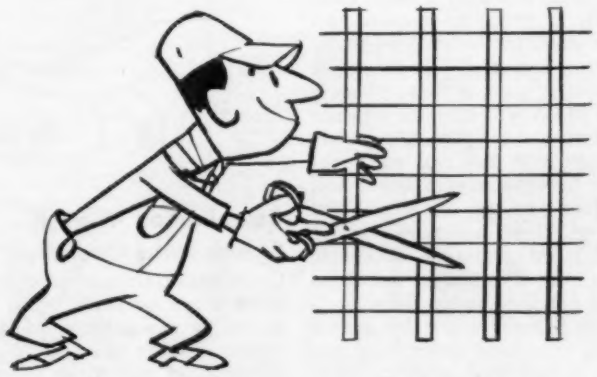
Have The Bees Heard?

HONEYCOMB is supposed to be one of the strongest materials available, but apparently the bees don't think so because a manufacturer of specialty steel wire is now selling appreciable quantities of tinned wire to bee keepers to provide added strength to the honeycombs.

The Hog and The Refrigerator

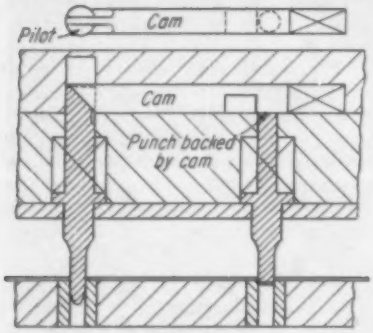
AFTER YEARS of refinement, the cost of the condenser of one of the country's major refrigerator manufacturers was hammered down to: "You can't take another penny out of the cost." The condenser was a steel tube, spot welded to a formed steel sheet that acted as a cooling fin. Direct labor cost was down to 10¢.

Then a manufacturing engineer visited a hog-fence plant and got the idea of making condensers like hog fences. "Make one set of wires as tubing with the cross wires as cooling fins. Make 'fence' and cut it up into condensers." It worked. A hog fence machine was installed and cost (which couldn't be cut another penny) was cut exactly 50%. •

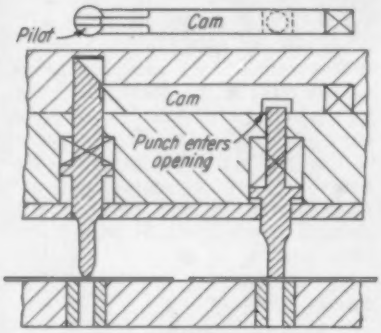


Practical Ideas

Pilot-Punch Arrangement Expands Automatic-Feed Capacity



Sketch 1



Sketch 2

With the system shown, we can pierce holes that are spaced twice the distance our automatic feed is capable of delivering stock. How is this possible? It is done by making the punch skip every other hole—it's that easy. But how do you prevent a punch from piercing the stock on the down stroke?

A look at the two views above tell the story. In sketch No. 1, the pilot is located in a hole previously pierced by the punch and a new hole is pierced. Sketch No. 2 shows the pilot striking blank stock thus acting upon a cam to deactivate the punch.

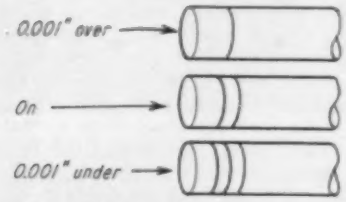
Both sketches are condensed so the whole process can be plainly seen though, actually, the center distance between the punch and pilot is 12 in. (our required hole spacing). The punch and the pilot, as well as the cam, are all spring returned, the cam and the pilot meeting in 45° faces. On the cam, this face is on a reduced portion which acts as a key in a slot milled at 45° on the pilot. Near the other end of the cam, an opening lines up with the punch when cam is in depressed position as in sketch No. 2.

In operation, stock is inserted through the automatic feed set for 6-in. (near maximum capacity) and positioned just past the punch. The press is started and the first hole is produced. On the next stroke, the pilot contacts the stock, pushing back the cam and exposing the opening, which allows the punch to ride back without piercing.

On the up stroke, the springs return the pilot, the punch, and the cam to their starting positions. Here they remain while the stock moves another 6 in. and, as the pilot finds the first hole, the punch this time being backed up by the cam, pierces the second hole. See sketch No. 1.

This method works well on stock 1/32 in. and heavier, but on lighter material, the pilot will leave an indentation between each hole.

Emil Loeffel, tool engineer, Metalcraft Mfg Corp, New York, N Y

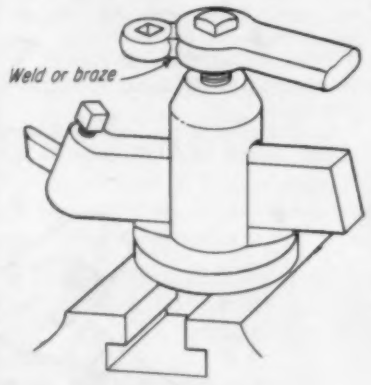


Rings on Reamers Save Finishing Time

A small shop can save a lot of time, especially if it has no regular tool crib and attendant, by marking reamers so they can easily be identified. For example, a set of three reamers for size 0.3125 will actually measure 0.3115, 0.3125 and 0.3135. These may be marked with one, two, and three rings or grooves around the shank ends. Then you can easily pick out the oversize or undersize reamer without messing around with code numbers or trying to read faint stamped numbers on the tools.

It might be most practical to groove the tools in reverse order, so if one reamer is reground down a thousandth or two, additional rings can be added to keep identification true.

Ernest K Schellhase, shop foreman, S A Oakley Co, Skokie, Ill



Combination Wrench Speeds Lathe Operation

Considerable time is saved when one wrench can be made to do the job of two or more. Adjustables can, of course, achieve this, but they must be adjusted and fitted to each application before use. Strength and resistance to wear is also a factor to consider, particularly with the repeatedly-used wrenches of the lathe-tool setups.

Here, two wrenches are most generally necessary—one to fit the tool post and the other to fit the tool-clamping screw in the toolholder. This we avoid by welding the head of the smaller wrench to the larger, making one wrench with two boxes. By combining the two, we have eliminated the nuisance of having to handle two wrenches for tool adjustment.

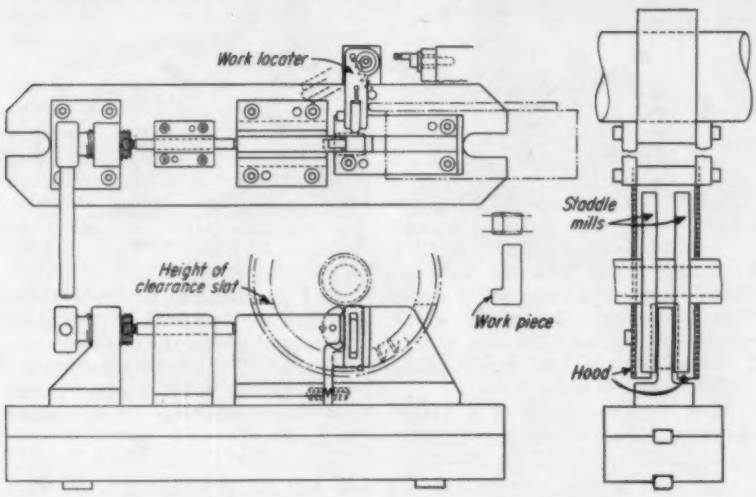
Charles H Willey, Penacook, New Hampshire

Rust Prevention

A few drops of soluble oil, placed in the cooling water at the pedestal grinder, will keep the water from getting rusty. It will also prevent some of the mess caused by rusting steel particles around the grinder. Only enough oil is needed to turn the water milky—too much will create a film.

H Josephs, Gardenville, Pa

Chipless Milling Improves Finish, Speeds Production



In many milling operations, the time spent on cleaning up between each setup can rival, and sometimes exceed, that of the actual machining cycle. When this factor is not taken into account in estimating costs, the end results are likely to be disappointing.

One way we have found in solving the chip problem is to apply a flood-coolant system. This cannot, unfortunately, be used on all types of milling, but it is often overlooked where it can prove itself beneficial.

One such setup, recently used in our shop for machining both sides of a small forging, best illustrates the advantages of chipless milling. Here approximately 10 gallons of coolant per minute were pumped onto the work and cutters.

The fixtures in this case consisted of a stationary jaw, a clamping jaw, a pressure pin and guide, and a clamping screw, all assembled on a flat base and 1/32-in. narrower than the finished thickness of the work. Mounting the fixture on the machine table in a pan of about 20-gal capacity took care of the coolant control at this point. Through a drain-off, the coolant was piped to a floor tank from where it was again pumped to the cutters.

The cutters were a pair of straddle mills, spaced to finish both sides of the part with one pass. They were encased in a hood made up of a cast-iron ring with 16-gage side plates—the outside one being made in two halves to facilitate changing cutter or making adjustments. The hood was, by means of a clamping ring and a pair of links, attached to the over arm of the miller. It completely enveloped the cutters except for a slot on the bottom through which the jaws of the fixture and work passed.

A swing-away locator, shown at top center of sketch, helped to speed up nesting the work. On contact with the hood, it snapped to open position as the work was fed into the cutters.

Thus, as the coolant was pumped to the hood, chips were flushed out as soon as created, leaving an excellent surface finish.

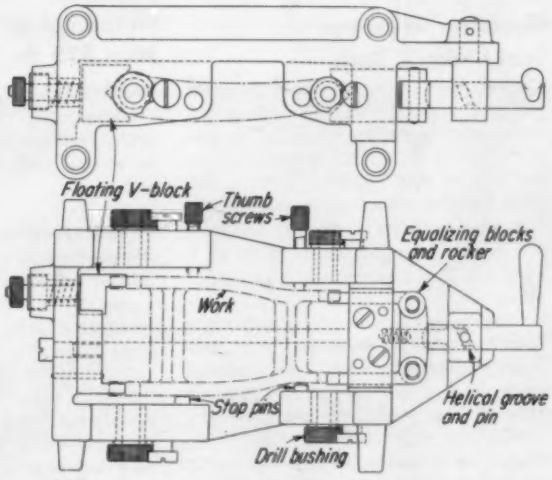
George F Oliver, Richfield Spring, NY

Fast-Locking Jig is Self Aligning

Four holes had to be drilled—opposing ones in line with each other—through a drop forged piece. But, because of its physical characteristics, it was necessary to drill the holes independently, two from each side. This called for a drill jig that would accurately locate the drill while, at the same time, taking care of irregularities in the forging.

The jig shown is our approach to filling these needs. For locating the work endwise, it has a floating, or spring loaded, V-block which allows for differences in length, and/or radius of the work, and a solid block mounted alongside the floating one to standardize the longitudinal hole location. Clamping is provided by two V-blocks at the opposite end which are pressure equalized by a rocker bar. Force behind the rocker is applied by a fast-locking device in the form of a pin-in-helical groove arrangement.

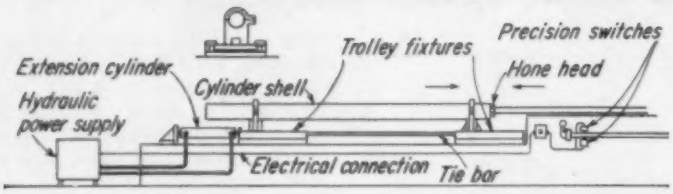
This furnishes all the holding pressure needed as the V-blocks are basically locating points. Two pins inserted on the inside of the jig and two knurled thumbscrews take the brunt of the pressure from the drilling operation. These four points should therefore have full contact with the work so the thumbscrews must be snugged up before final lockup with the equalizing blocks.



Hjalmar Dahl, Upplands Vasby, Sweden

Practical Ideas

Fixture Extends Stroke Capacity of Honing Machine



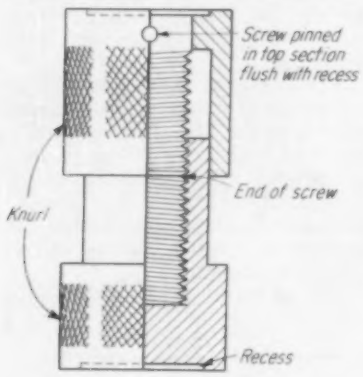
The setup shown on a standard-horizontal honing machine adds 2 ft to its stroke capacity. These are hydraulically powered trolleys (coupled with a tie rod) that are synchronized to move in the opposite direction to the machine's honing head. As a result, the strokes in both directions are uninterrupted from one end of the work to the other.

We had good reason for making this addition—it wasn't done for kicks—having been repeatedly faced with jobs of honing cylinder shells a good deal longer than the 10-ft capacity of our machine. So, to avoid "double ending" the work, which would only mean higher cost at second-best accuracy, the reciprocating tandem fixtures were made.

Each fixture consists of a trolley carrying a split clamp bored to the OD of the work. It moves smoothly on roller bearings in a flat base clamped to the machine bed. The two used are joined with a tie bar.

Connected to the trolley on the far end is the piston rod of a hydraulic cylinder. This is needle-valve regulated and mounted on an angle bracket which, like the fixture bases, is secured to the machine bed. The hydraulic-power source for the extension cylinder is controlled by an air cylinder which, in turn, is controlled by precision switches. These switches are activated by the main control rod, giving the operator complete mastery of the length of stroke.

Bill Hewitt, plant engineer, Cascade Manufacturing Co, Portland Oregon



Shielding Improves Tool-Maker's Jack

Though not designed to lift great weights, the tool-maker's jack has a number of useful applications around the shop. It is an important tool on the layout and inspection table and it is equally valuable in supporting extended sections of work in the miller or on the grinder as well as a heel-block supplement for irregular strap work.

Most jacks, however, have a common fault which makes them particularly vulnerable when they are used in milling or grinding; the jackscrew threads are exposed. Abrasive grit or metallic particles then easily find their way between the threaded members, and nothing short of complete disassembly and cleaning will restore the jack's smoothness of operation.

Not so with the jack shown. Its thread, for the entire length of the screw, is completely protected by its adjustable section. In fact, it forms a shield which has an ID only 0.005 in. larger than the base OD it covers to adequately overlap the base body just when the screw is safely engaged.

Made in three sections, the jack is easy to construct and assemble. The top and base sections are both turned from 1-in. bar stock and the screw from ½-in. drill rod. Using 20tpi, the drill rod is threaded ¾ in. leaving ¼ in. blank to be pressed into the top part flush with a recess. The two are pressed together while the screw is threaded, at least half way into the base, after which they are locked with a ⅛-in. pin riveted on both ends. A strip of knurl on the periphery of each half improves the grip for adjusting the jack, and the recesses at both ends insure solid lands.

Henry E Piltz, East Orange, NJ

L Kasper, Philadelphia, Pa Won $25 for his idea:

Side-Action Die Forms External Beads
in the Feb 6, 1961 issue

AN EXTRA $25 will be paid for the best Practical Idea in each issue of *American Machinist/Metalworking Manufacturing*. Selection of the winning ideas made by a group of our readers.

PAYMENT—in addition to regular rate for item published—will be made as soon as tabulations are completed. The winner or winners—in case of a tie when duplicate prizes will be awarded—will also be announced in these pages.

JUDGES . . . are a group of *American Machinist/Metalworking Manufacturing* readers who select articles they prefer in a particular issue. This group changes entirely with each issue and represents a true cross-section of our readers. Their decision is accepted by the editors, without reservations or bias, as final in each case.

REQUIREMENTS—All items appearing in the Practical Ideas pages are eligible. They must be submitted by the originator on an exclusive basis. Do not worry about your shortcomings as an author, draftsman, or photographer—every item will be edited in accordance with *American Machinist/Metalworking Manufacturing* standards. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER—Anyone may enter except employees of McGraw-Hill Publishing Co. Inc, and those of its advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send all entries to: "Practical Ideas Editor" *American Machinist/Metalworking Manufacturing*, 330 West 42nd Street, New York 36, NY.

Names in the News

Hyster Co, Portland Ore, has elected **James L Woodley** (left) vice president, manufacturing. He was formerly manufacturing manager. **Glenn Herz,** chief engineer, has been elected vice president engineering

Stanley Works, New Britain, Conn, manufacturer of builders' hardware and hand tools, has elected **Howard L Richardson** president to succeed **John C Cairns** who has been named chairman of the board. Mr Richardson has been executive vice president of the firm since 1959.

Federal Tool & Manufacturing Co, Minneapolis manufacturer of short run stampings, has named **Harold F Griffiths** sales manager. He was formerly sales manager for the company's Hollywood, Calif, office.

United States Chemical Milling Corp, Manhattan Beach, Calif, has elected **Thomas L McKnight** president.

International Harvester Co has promoted **J Stewart Cruickshank** from assistant works manager to works manager at the Milwaukee plant.

Crane Co has named **Eugene H Kolb** vice president and general manager of Chapman Valve Manufacturing Co, Indian Orchard, Mass. He was formerly general manager of Ralph J Stolle Co, Ohio manufacturer of machine tools and metal products.

Bendix Corp has elected **Charles E Heitman Jr** a vice president. He will continue to serve as the group executive in charge of the Bendix Products Division, South Bend, Ind, and the Sheffield Corp, a subsidiary in Dayton, Ohio.

Blackstone Corp, Jamestown, NY, maker of ultrasonic cleaning and generating equipment, has appointed **John A Antonevich** director of ultrasonic research and development. He was formerly associated with Battelle Memorial Institute as principal electrical engineer.

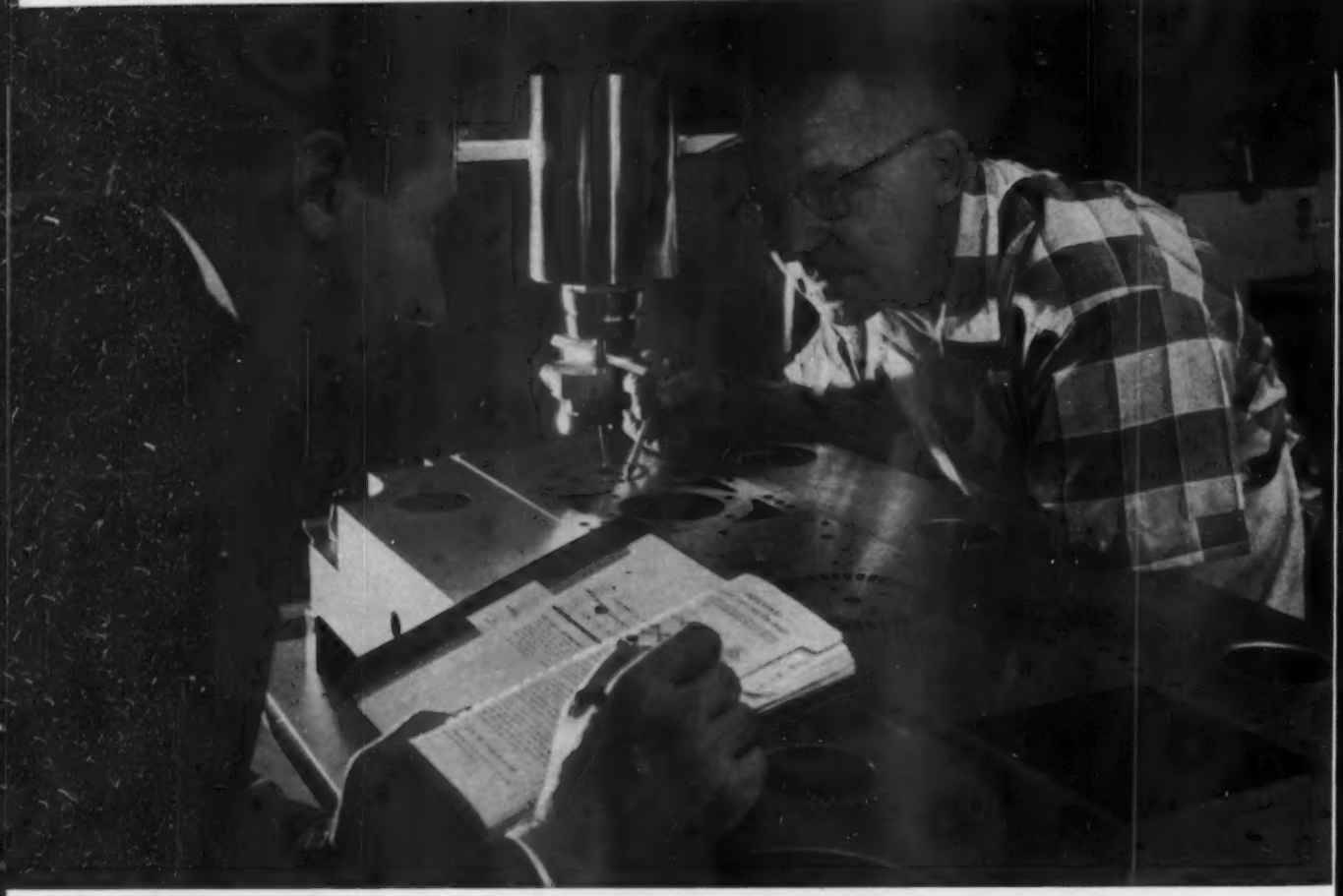
Gleason Works, Rochester, NY, has named **Wells Coleman** (top) chief gear analyst. **Bruce O Winans** has been appointed supervisor of technical computation

General Electric Co has named **Robert L Aughenbaugh** manager, manufacturing, for heat processing equipment at the Industrial Heating Department. He was previously manager, manufacturing engineering.

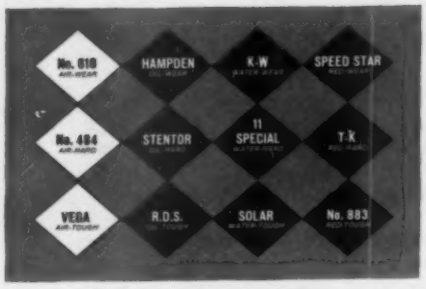
(Continued on page 216)

Gisholt Machine Co, Madison, Wis, has announced that **Robert H Bruce** (left) will retire as vice president, sales, on June 24. Mr Bruce will act in an advisory capacity until his retirement becomes effective. His duties will then be assumed by **Robert H Presnall** who has been appointed general sales manager

Ford Motor Co has appointed **Leo W Tobin Jr** executive assistant to the vice president of manufacturing. He was previously manager of the A C Spark Plug Division's Milwaukee plants



But what about the RELIABILITY FACTOR in the selection of tool and die steels?



More output per grind . . . steady, high volume production at low cost . . . these are tooling benefits you look for on the job. They stem from the basic quality built into these three Carpenter MEL-TROL® Air-Hardening Tool and Die Steels . . . VEGA-FM, No. 484-FM, and No. 610-FM. Yet, good toolmen know that dependable performance hinges on still another factor: a sound, reliable way to select the right steel for each job. Here's exactly why Carpenter's Matched Set of Air-Hardening Tool and Die Steels gives you a tooling plus: You select quickly and accurately from just three grades to get the exact properties you need for almost any air-hardening application—maximum wear resistance (No. 610), maximum toughness (Vega), or a good combination of hardness and toughness in No. 484.

What's more . . . you know in advance that the steel you select will "deliver the goods". And realize, too, that these three steels are carried in ample stocks for quick delivery from your nearest Carpenter SERVICE-CENTER.

Carpenter steel

you can do it ***consistently*** better with Carpenter Tool and Die Steels

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

CIRCLE 259 READER SERVICE CARD

Molecular Bond of Stainless to Aluminum Produces Sheet With Properties of Both

Reportedly the first successful molecular bond, in sheet form, of stainless steel and aluminum, a new material called stainless clad aluminum is now available in limited quantities to the metalworkng industry. Full production is expected to be in effect later this year.

Normally, ferrous and nonferrous metals have little affinity for each other; however, this material is a true combination of the two metals into a sheet that is about half the weight of the same size in stainless. Unlike the union of these metals by casting, this is a single material with the desirable characteristics of each metal.

According to the manufacturer, there are no technical limitations as to the gage of the stainless clad, nor are there any fixed content ratios of stainless to aluminum. A sheet of stainless clad aluminum 0.050-in. thick would be made up of 0.009-in. stainless and 0.041-in. aluminum.

First applications will be for cooking utensils. However, the company points out that the clad aluminum has many broad industrial applications. As examples of its versatility, they point to its possible use as a construction material for liquid storage tanks, or as a material for automotive parts normally made of stainless, and as a basic metal for rockets or missiles.

The material, which climaxes years of research, development, production, and testing, is said to show excellent metallurgical characteristics during fabricating operations such as deep drawing, stamping, trimming, beading, spinning, arc welding, stud and spot welding, brazing, coining, and in many surface finishing operations.

The process for bonding the stainless steel and aluminum was developed by Composite Metals Products, Inc, of Washington, Pa. However, an agreement gives Fairmont the right to manufacture and sell the dual metal, while Composite retains possession of the patents.

The metal is recommended for industrial situations where the characteristics of stainless (such as resistance to corrosion and staining, hard finish, strength) and those of aluminum (such as lightness, heat conductivity, formability) are both desirable.

Fairmont Aluminum Co, Fairmont, W Va

MORE DATA? Circle 92, inside back cover

Turco Develops 1-Step Cleaner And Conditioner for Metals

WO No. 1, which is specifically designed to simplify the pre-paint treatment of metal surfaces, cleans, passivates, and removes corrosion all in one step. It removes and prevents light oxides and corrosion, and in the same operation produces a slightly porous surface which absorbs primer, providing a firm base for paint.

Turco Products Inc, 24600 S Main St, Wilmington, Calif

MORE DATA? Circle 93, inside back cover

Carpenter's Tool Steel Gives 4 Times Normal Wear Life

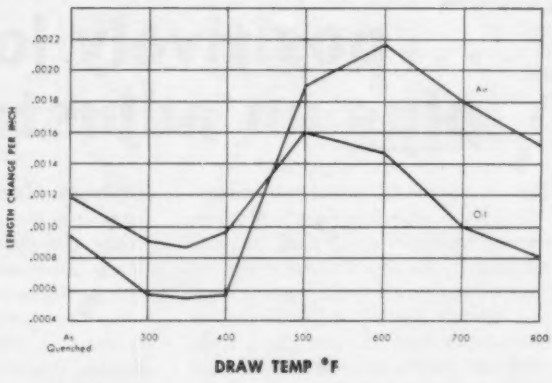
Hi Wear 64 is a tungsten tool and die steel that is said to offer up to four times the service life of high carbon, high chrome steels.

The new steel is a deep hardening grade that hardens through to the center in sizes up to 6 in. cross section when oil quenched from 1450 F. In addition, Hi Wear 64 can be air hardened in intricate shapes up to 2 in. diameter at 1550 F. High carbon, high chrome steels require temperatures of 1800 F or more for air hardening so that the relatively low hardening temperature of Hi Wear 64 gives this metal more protection against decarburization, distortion and surface damage.

As its name indicates, the new steel has an average hardness of Rh 64 C when heat treated in the recommended manner. Minimum size change (see chart) occurs after tempering in air at 300 to 400 F. A one-in. piece, air treated at 1600 F, will expand 0.001 in. when hardened but will return to within 0.0005 in. of its original length when tempered in the above temperature range.

Hi Wear 64 is recommended for punches, dies, tools and mold plates where maximum wear resistance is a prime consideration. It is said to forge much like high carbon chrome steel, after uniform heating to 1900 F. Drawing should be done at 350 F for the best combination of hardness and toughness but drawing temp may be upped to 400 F for greater toughness with a slight sacrifice in hardness.

A type analysis of Hi Wear 64 shows:



Carbon 1.50%, Manganese 2.00%, Silicon 0.25%, Chromium 0.90%, Molybdenum 1.00%, and Tungsten 4.00%. Because of this balanced analysis the steel cannot be annealed softer than about 255 to 265 Brinell. Despite this, the manufacturer says it machines as well as high carbon, high chrome types.

Also, since it is not designed for red hardness the new tool steel should not be used where service temperatures exceed 350 F.

The Carpenter Steel Co, Reading, Pa

MORE DATA? Circle 94, inside back cover

NEW

KENDEX* Profiling Tool

. . . positively locked insert plus an adjustable chipbreaker

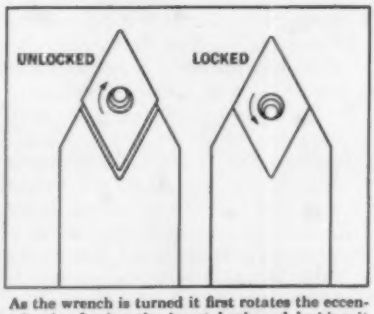
Now in one profiling tool you can get *both* of the latest design improvements. Another "first" from Kennametal Inc., the new Kendex Profiling Tool (A) securely holds inserts during normal cutting, back facing or contouring, and (B) permits a wide range of chipbreaker adjustment by simply turning a dial wheel.

The main design feature of this dramatically new Kendex tool is the eccentric pin that holds the insert securely in place. Positioned through a hole in the insert, this pin, plus the top clamp, positively eliminates any movement of the insert.

Just by turning the threaded dial wheel, the "Dial-A-Breaker" provides a wide range of adjustment of chipbreaker land width. Still another feature is the spring plunger that raises the chipbreaker when the clamp is released, making it easier to change, index or invert the insert.

Performance-proved on job after job over a period of months, the new Kendex Profiling Tool is now available from stock in three holder styles. The diamond shaped insert has a 55° nose angle, suitable for practically any profiling job. It is set in the holder at 5° negative side and back rake to provide four accurately indexable cutting points.

Get the complete story on this new profiling tool. Call your Kennametal Representative or write direct to KENNAMETAL INC., Latrobe, Penna.



As the wrench is turned it first rotates the eccentric pin, forcing the insert back and locking it against two walls of the recess. Further rotation of the wrench locks the eccentric pin so that it cannot loosen during use.

*Trademark

33599

INDUSTRY AND KENNAMETAL
. . . Partners in Progress

GE's Silicone Rubber Forms Metal Bond That Is Stronger Than Material Itself

A new family of self-bonding silicone rubber compounds and reinforced gums is said to give a primerless bond to ferrous-containing metals that is stronger than the highest strength silicone rubber. In addition to this, the Silicone Products Dept of GE has also introduced a new extreme low-temperature resistant silicone rubber compound for use in molded and extruded seals and gaskets.

The self-bonding rubber, known as SE-5504U, is designed specifically for bonding rubber to ferrous metals. Because it reacts chemically with ferrous metals, the bonder eliminates the need for sandblasting the metal surfaces—a toluene wash is sufficient to clean most surfaces—and also does away with detergent washes and primer coating. After the toluene wash, bonding with SE-5504U requires only two steps: press-curing the rubber and heat post-cure.

Press-curing takes from 30 min to an hour—15 to 30 min at 270 to 300 F with Benzoyl Peroxide powder as catalyst, 15 to 30 min at 330 to 350 F with Varox or Dicumyl Peroxide as catalyst.

Post-cure determines the final strength of the bond. With a 4 hour post cure at 400 F, the compound shows a hardness (Shore A) of 50, a tensile strength of 1550, elongation of 600%, and tear strength of 600. Tables supplied with the cement give times and temperatures for other hardnesses, tensile strengths, etc.

According to the manufacturer, excellent bonds have been made with SE-5504U to steel, chrome steel, and stainless. Used with primer, the cement will also adhere to aluminum and aluminum alloys. Bond strength with these alloys, however, is somewhat less than with iron alloys.

General Electric's other new silicone compound, designated SE-5401U, is a gray, 40 durometer, Class 500 rubber recommended for seals and gaskets that must keep their flexibility at extremely low temperatures. The compound is said to band easily on a rubber mill and may also be molded, extruded, or calendered. SE-5401U cures with the same catalysts as does SE-5504U, but requires longer curing times. After 24 hr cure at 400 F, the rubber will have a tensile strength of 1150, elongation of 500% and a tear strength of 80. The normal gray color of SE-5401U can be changed by adding 1-2 parts pigment to 100 parts of the compound.

Bond is stronger than rubber itself, as demonstrated by these two plates bonded with new GE compound. Rubber ruptured after stretching to five times original size; bond stayed firm

General Electric Co, Silicone Products Dept, Waterford, NY

MORE DATA? Circle 95, inside back cover

3 Ultrasonic Cleaning Fluids Take Advantage of Cavitation

The following three new specialized cleaning solutions are said to take advantage of ultrasonic cavitation to apply to a wide range of applications:

- No. 222 is a waterless, ammonia-free solution that was especially formulated for use in cleaning operations where the use of ammonia would not be chemically desirable. It can give copper, brass, and steel parts a brilliance and lustre that was previously possible only with the use of ammoniated cleaners. And, since it contains no volatile ammonia, the solution does not lose its cleaning properties by dissipation in the atmosphere.
- No. 112 (ammoniated) is designed for the removal of gummed oil and grease, oil-soluble cutting oils, asphalt and tar, carbonized residues, sulphides, waxes, fluxes, ordinary oil, fingerprints, and other foreign particles from precision metal parts.
- Hydro-Sonic Cleaning Solution concentrate, when diluted with seven pints of water, will produce a gallon of water base ultrasonic cleaning solution capable of instantly removing all water-soluble soils, fingerprints, lapping compounds, and cutting oils, waxes, rouges, and tripoli from metal, glass and plastic. It is completely rinsable in water.

The company invites people with cleaning problems to submit components to them to be cleaned in their laboratory. After they have been cleaned, they will be returned with a complete report and recommendations for future cleaning, using specific cleaning solutions.

L & R Mfg Co, 577 Elm St, Kearny, NJ

MORE DATA? Circle 96, inside back cover

Brazing Alloy Available for Air-Gun, Syringe Application

Designated the Nicrobraz A series, this new brazing alloy is designed to give speed and ease of application. These alloys are applied by an air-gun method for production work or by manual syringe for smaller jobs. Alloying time is said to be reduced 50% with the new form.

All established Nicrobraz alloys are to be available in the new form and are applicable wherever the powdered materials have been used in the past. These alloys are supposedly designed for use in applications involving high temperature.

Stainless Processing Div, Wall Colmonoy Corp, 19345 John R St, Detroit 3, Mich

MORE DATA? Circle 97, inside back cover

Solvent Degreaser Said 25 Times Safer Than Carbon Tetrachloride

SS-25, a new solvent degreaser rated 25 times safer than carbon tetrachloride, may be used for in-place cleaning, immersion cleaning, or for cleaning disassembled motors safely with no danger to delicate parts.

Classified as to fire hazard only by Underwriters Laboratory, SS-25 has a specific gravity of 1.01, no flash at the boiling point, MAC of 435 ppm, 0° residue on drying, sweet odor, and toxicity at least 25 times safer than carbon tetrachloride.

National Chemsearch Corp, 2417 Commerce, Dallas 26, Tex

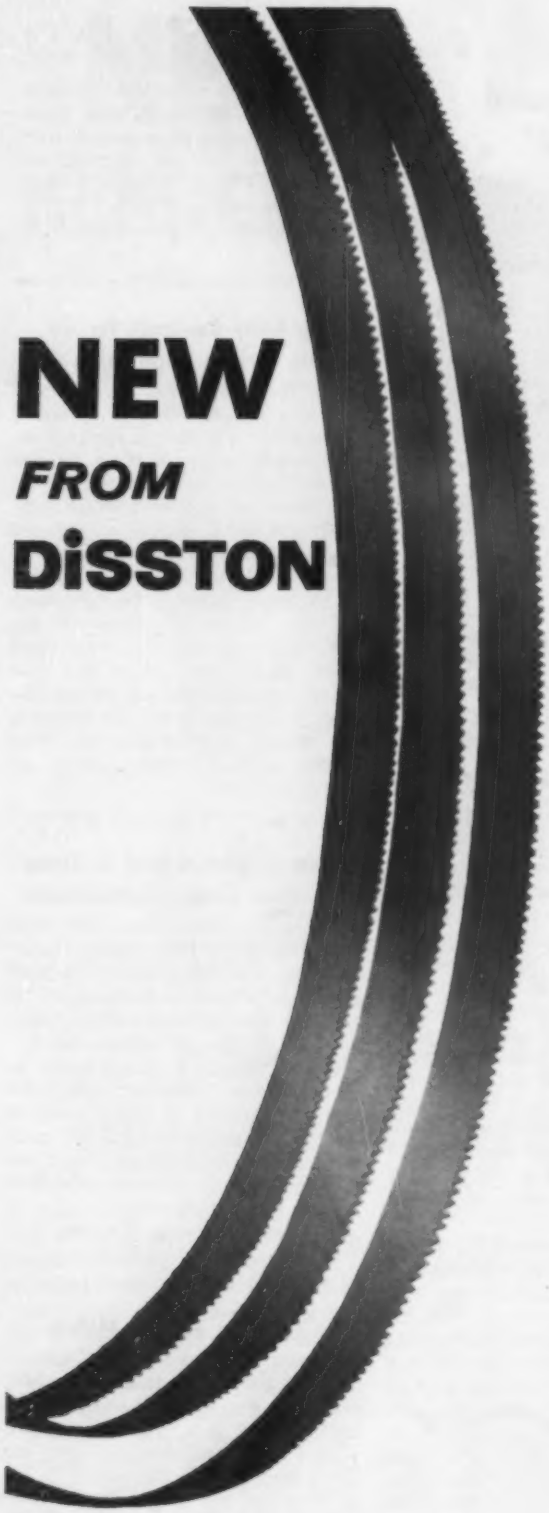
MORE DATA? Circle 98, inside back cover

Two Coatings Protect Metals

Two new coatings for metal protection are part of the line of non-flammable, water-based Lacqua products. M-302 is a clear coating designed for metal finishers who use force-drying for coated parts. It can be cured as low as 140 to 150 F for 10 min, or as high as 275 F for 7 min. M-804 is applicable to baking systems and is fast curing. It will cure in 15 min at 275 F.

Bee Chemical Co, 2700 E 170th St, Lansing, Ill

MORE DATA? Circle 99, inside back cover



NEW FROM DiSSTON

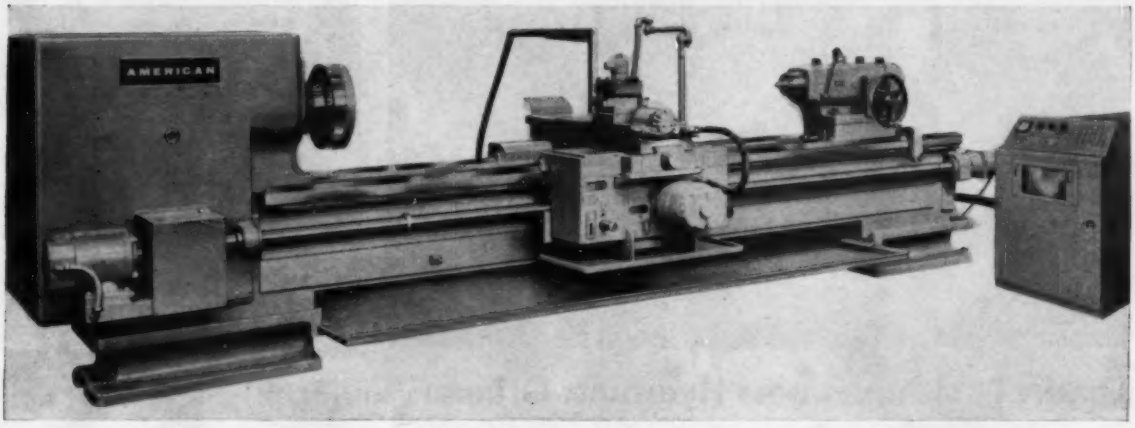
MOST ADVANCED HIGH SPEED STEEL BAND SAW BLADE AVAILABLE

Four exclusive production *firsts* increase blade life 30 times over regular blades.

- **EXCLUSIVE "FLOW-SET"** — Newly developed equipment produces extremely precise setting of saw teeth. The precision "flow-set" evenly distributes the chip load to each set tooth. You get maximum cutting efficiency, smoother cuts and longer blade life — up to 30 times over that of regular blades.
- **EXCLUSIVE "UNI-HEAT"** — New heat treating units developed by Disston metallurgists consistently reproduce the delicately balanced combination of hard, wear-resistant teeth and a tough flexible back. Controlled hardening is maintained from coil to coil. You can cut 12 times faster and at higher temperatures with a Disston band. Production is actually increased.
- **EXCLUSIVE "FINE LINE" TEMPER** — New tempering furnace, electronically regulated, assures uniformity of tempering temperatures throughout. Each tempering cycle is sentry guarded. You get straighter cuts without danger of breaking from these unusually strong Disston bands.
- **EXCLUSIVE "LIFE WELD"** — New, specially built welding equipment is used in the joining of each Disston band. Perfect match of teeth, proper blade alignment and superior weld dressing give you a smoother running blade.
- **EXCLUSIVE "EXTRA SMOOTH"** — New satin finish means less friction guide drag and closer guide adjustment for straighter, truer cuts. Uniform coolant flow and minimum material build-up on side of blade.

Add up these Disston exclusives — see why new Disston High Speed Steel Bands offer more for your money than any other blade!

DISSTON DIVISION PORTER ***H. K. PORTER COMPANY, INC.***



American Tool Work's Lathe Line Has Mark Century Controls

A new line of lathes—specially designed and built for continuous path tape control—has been introduced in sizes 2010, 2413, 2514, and 3019. Each is controlled by a General Electric Mark Century continuous path control system (*AM/MM*—Aug 22 '60, p509), which uses one-inch, 8-channel punched tape.

Accuracy of the lathes' crossfeed screws is 0.0002 in. per foot, and accuracy of the longitudinal screw is 0.0005 in. per foot. A square, tape-controlled, four-way tool turret is mounted by curvic coupling for a repeatable indexing accuracy of ± 0.0002 in.

Newly designed from the ground up, this heavy-duty lathe line is designed to handle all roughing as well as finishing on any turning, boring, and facing operation. Three extra-heavy bearings support the spindle, and starting, stopping, and braking of the spindle is by control of the main drive motor. All headstock gears are hardened and ground and automatically lubricated by Cascade oiling.

Because the lathes have extra long carriage bridges and cross feed screws, the 2010 and 2413 models have 16 in. of travel for tool slide; the 2514 and 3019 have 20 in. This extra travel gives an advantage to tape controlled boring as well as easy access of the tool to an optical tool-setting gage.

The 2010 and 2413 have two-speed heads with a total speed range, in conjunction with their 16-to-1 motors, of 25 to 1800 rpm through 30 taped changes. Maximum motor size is 30 hp. Swing over the carriage wings and swing over carriage bridge and tool block are 21 and 10 in. for the 2010 and 24 and 13 in. for the 2413, respectively.

The 2514 and 3019 also have two-speed heads with a total speed range, with 16-to-1 motors, of 16½ to 1200 rpm through 30 taped changes. Maximum motor size is 50 hp. The 2514 swings 25½ in. over carriage wings and 14 in. over carriage bridge and tool block. These swings for the 3019 are 31 and 19 in.

The American Tool Works Co, Pearl at Eggleston Ave, Cincinnati 2, Ohio

MORE DATA? Circle 51, inside back cover

Portable Instrument Measures Finishes of 1 to 1000 Microin.

Designated Model MS 1000 Surfindicator, this new portable instrument, which is transistorized and battery-powered, makes precision measurements from one to 1000 microin. at any point in a production line or inspection area. The pickup stylus, which can detect variations of ½ microin. within the measurement range, contains a transducer element which generates a current proportional to surface variations.

As the stylus tip—which consists of an 0.005-in. radius sapphire—is moved over a test surface, small deflections are transmitted through a viscous fluid coupler to the current generator inside the pickup.

Possible errors which might result from surface waviness as distinguished from roughness are eliminated by wave-length cutoffs which are adjustable for the particular surface under test. Three cutoff wavelengths provided for different ranges of work are 0.030, 0.010, and 0.003 in.

Price of the 5½-lb instrument is $920 fob, with **30-day availability.**

Brush Instruments, Div of Olevite Corp, 37th at Perkins, Cleveland 14, Ohio

MORE DATA? Circle 52, inside back cover

Landis Tool Announces Hydraulic Grinder That Makes Fast, Deep Cuts Automatically

This automatic, 18-in. hydraulic surface grinder cuts ¼ in. off the face of a cast iron block at a rate of 2 fpm. At slower speeds, cuts ⅜ in. deep can be made in cast iron, and at normal speeds, steel castings can be ground 0.10 in. per pass.

Unlike earlier hand-operated models, this grinder has a preset micrometer thimble that controls the amount of stock to be removed and an automatic table adjustable to 40 fpm infeed speed. When the amount and rate of stock removal and the number of finishing passes have been selected, the machine starts an automatic cycle, feeding the work into the grinder until the stock is removed.

The grinder then goes into a finishing cycle and, when this is completed, the table stops in loading position and shuts down. For repetitive work, the micrometer may be set to cut off at a selected size instead of a preset stock removal.

Other features of the grinder: 12 x 36 in. worktable with a max stroke of 24 in., four-in. manual crossfeed and an 18-in. cup, ring or segmental grinding wheel, 15-hp spindle motor, 900 rpm max speed.

Cuts described earlier are found most satisfactory when using an 18 x 3 in., resonoid-bonded, ring grinding wheel.

Landis Tool Co, Waynesboro, Pa

MORE DATA? Circle 53, inside back cover

ROTOGRIND CHECKS TRUENESS of parts to less than 10 millionths in runout, and concentricity to less than 20 millionths, according to maker. Special slip clutch works under power to prevent jamming or breaking of gears; equally spaced indexing gives 2, 3, 4, 6, 8, 12, or 24 combinations—*M&M Tool & Mfg Co, 1124 E Third St, Dayton 2, Ohio*

MORE DATA? Circle 54, inside back cover

Energy Storage Capacitors Give Peak Power of 20,000 Megawatts

A line of four low-inductance energy storage capacitors—designed especially for high-intensity, fast-discharge application—such as magnetic forming—is offered in individual units or in complete energy storage systems. The improved design of NRG-type energy storage capacitors are obtainable with peak power ratings up to 20,000 megawatts for discharge intervals ranging from microseconds to milliseconds.

The four different series in this line are, briefly:

- Rectangular case NRG-200 which lists five units at 20 kv dc in capacitances ranging from 5.0 to 15.0 mfd with 1000 to 3000 watt-sec;
- Round case NRG XN-249 series which offers voltage ratings from 30 to 120 kv peak dc voltage, capacitance from 0.5 to 10.0 mfd, with 2500 to 7200 watt-sec ratings;
- Round case NRG-300 series which is available in 14 "standard" units rated from 6 to 125 kv, 0.1 to 40.0 mfd, and 80 to 5000 watt-sec;
- NRG-114 rectangular case series offers a relatively low-cost unit for millisec discharge duty involving voltage reversal of 50% or less.

Applications data and standard listings showing dimensional drawings, ratings, and typical sizes are included in the manufacturers CDE Bulletin No. 191.

Cornell-Dubilier Electronics Div, Federal Pacific Electric Co, 333 Hamilton Blvd, South Plainfield, NJ

MORE DATA? Circle 55, inside back cover

DeVlieg Cutting Tool Holders Handle Hardest Carbide Grades

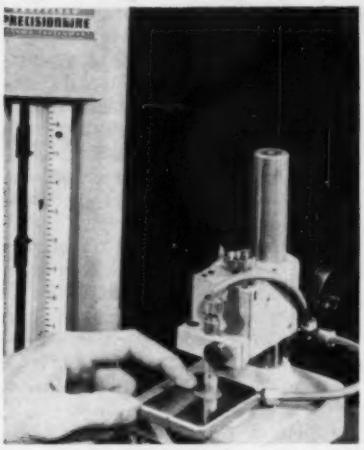
This new system of cutting tool holders handles those hardest grades of disposable carbide edges which provide much longer wear resistance in cutting operations, yet cannot be brazed normally due to danger of cracking. Clamp-on or type C holders (back row) are for large bores; screw-on or type S holders (foreground) are for general purpose precision boring operations.

For a user, the system is said to provide increased machine tool output, or less cost per piece. It allows accurate, rapid indexing of the cutting edges without removing them from the machine, heavier cuts, and savings from eliminations of grinding for resharpening.

Cutting edges are adjusted in seconds to precise limits by the Microbore micrometer-vernier principle built into the cartridge, Type S is for boring operations in the smaller hole sizes down to and including 15/16-in. dia. Type C is particularly well suited for large bore sizes (No. 10, 15, and 20) for light, medium, and heavy machining.

Microbore Div, DeVlieg Machine Co, Royal Oak, Mich

MORE DATA? Circle 56, inside back cover



Sheffield Gage Measures Thin Materials Without Pressure

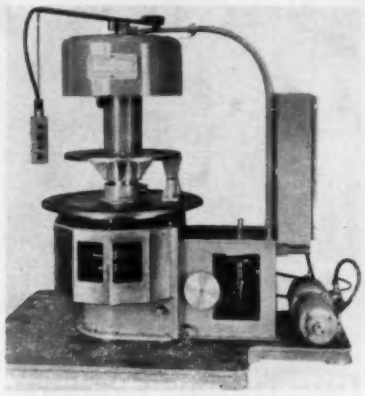
Designed to measure the thickness of thin, fragile materials such as semiconductor wafers and dice of germanium and silicon without gage point pressure, this new Precisionaire non-contact thickness gage literally floats in air during gaging.

The pressure-free gaging operation is obtained with opposed airejets; one is in the head, the other in the anvil. Air flowing out of the jets calipers the part to give accurate, repeatable thickness indication by the position of the float in the column.

The gage head has both fine and coarse adjustments. It is adjustable from 0.001 to four in., and can be used to measure the thickness of plastic film, sheet rubber, thin glass, and other materials. Polished metal can be checked without scratching.

The Sheffield Corp, Subs of The Bendix Corp, Dayton 1, Ohio

MORE DATA? Circle 57, inside back cover



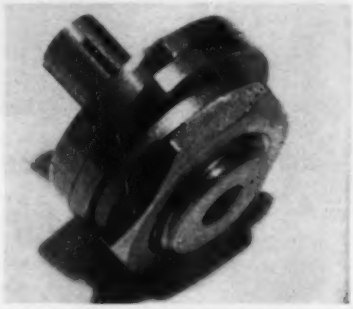
Assembly Machine Has 360° Available for Tooling Purposes

Model 60's indexing and tooling motions are all controlled from one central cam shaft. Power pick-offs from the central cam shaft provide auxiliary cam shafts and sprockets to actuate tooling all timed directly with the main cam shaft. The machine is specifically designed for assembly work and is particularly well suited to the assembly of a large number of components combined with the in-process inspection of the assembly, stage by stage.

Coining, staking, crimping, and inserting operations are easily performed from the moving tooling platform without any auxiliary power source. Tooling can be mounted inside, outside, above and below the indexing worktable with power take-offs in all tooling areas. Automatic lubrication is standard. The machine can be furnished with an approved explosion-proof electrical control system for use in hazardous areas. The unit is available as a bare chassis or completely tooled.

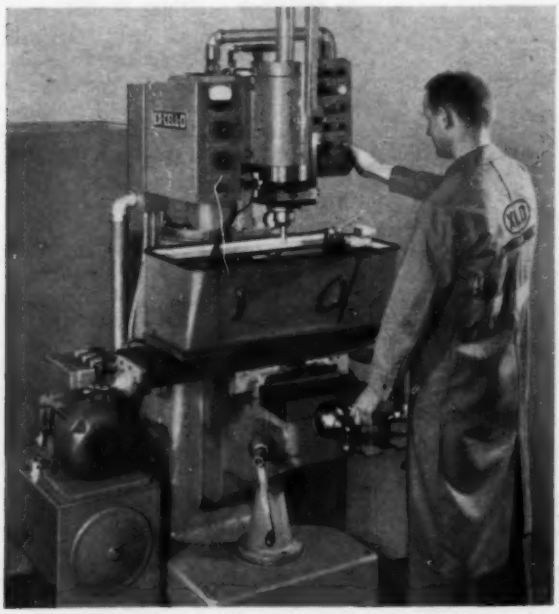
Bodine Corp, 317 Mountain Grove St, Bridgeport 5, Conn

MORE DATA? Circle 58, inside back cover



ADJUSTABLE CAM ASSEMBLIES, in a newly developed miniature size, are designed for use in all precision timing applications. They feature positive locking at any pre-determined operational setting within 0 to 180°. Machined from 303 stainless, they are stocked in 0.1248, 0.1873, and 0.2498-in. bore sizes, in pin or clamp-type sub styles—*PIC Design Corp, 477 Atlantic Ave, East Rockaway, LI, NY*

MORE DATA? Circle 59, inside back cover



Ex-Cell-O's Lectra-Form EDM Cuts Dies And Machines With Copper-Base Electrodes

The Model 244 Lectra-Form hold electrodes up to 100 sq in. and drills, pierces, trepans, or makes cavities in electrically conductive materials. When rough cutting, the machine removes 1 cu in. of metal an hr at a wear ratio of 2.5:1, fine cutting with this machine removes 0.0068 cu in. an hr at a ratio of 1:1. (These figures are based on cutting hardened HSS with yellow brass.)

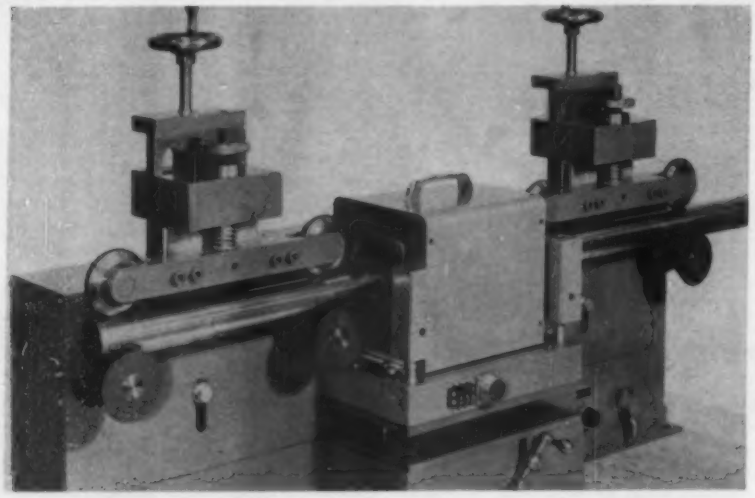
A vertical, hydraulically-operated servo assembly advances the cutting electrode and, to keep a constant space between the work and tool, this servo automatically retracts the tool whenever the gap becomes too small. This allows the gap to be cleared of residue, after which normal automatic forward feed is resumed.

A 55-gal floor-mounted tank holds the dielectric fluid, which is pumped into the 19 gal capacity work tank after the work has been clamped in place. When a cut has been completed, this fluid is dumped automatically.

The work table on the Model 244 is 10 x 23 in.; the tank size is 27 x 14 x 12 in.; and maximum distance from the work mounting plate to the electrode mounting surface is 21 in.

Ex-Cell-O Corp, 1200 Oakman Blvd, Detroit, Mich

MORE DATA? Circle 60, inside back cover



The self-feed feature of these tools, according to the manufacturer, guarantees the production of gage-perfect threads even when used for reentry with finishing taps for tapping in two operations. There is no thread distortion or double threading.

Because the tapper has an adjustable releasing feature, accurate thread depth is positively maintained. Length of pullout for releasing can be varied from a minimum of 1/16 to a maximum of ¾ in.

Holders are at present available in the following tap capacities: ⅝-in. dia from No. 0 to 12; 1-in. dia from No. 0 to ½ in.; 1¼-in. dia from No. 10 to ⅝ in.

Tapmatic Corp, 845 W 16th St, Costa Mesa, Calif

MORE DATA? Circle 64, inside back cover

Magnaflux Introduces Two Tubing Feeders

Two new drive units, built specially to feed round tubing and bar stock in conjunction with electronic test equipment in mill operations, are also said to be able to solve a variety of other materials handling problems. Constant speed, minimum deviation from coil centerline, and easy access to coils for rapid size change-over are features.

The X-2316 (shown) handles diameters in a range from ¼ to 4 in. and an adjustable speed drive, working through V-pulleys, gives speeds from 40 to 400 fpm, controlled by a forward-neutral-reverse switch in combination with a potentiometer.

Companion to this is the S-2366 which handles diameters from ¼ to 1½ in. Its constant speed reduction gives 2-speed operation, either 180 or 300 fpm. Other speeds may be obtained by changing pulley sizes.

Magnaflux Corp, Subs of General Mills, 7300 W Lawrence Ave, Chicago 31, Ill

MORE DATA? Circle 62, inside back cover

Ultrasonic Drill Said Twice As Efficient as Older Model

This new Glennite ultrasonic drill Model D-101A has product improvements which are said to make it almost twice as efficient in multiple machining, slicing, cutting, and etching as the model that it supersedes. It will handle tool sizes up to ¾ in. on a diagonal.

Sample rates (given in ipm) with this ¾-in. tool include: glass, 0.200; ceramics, 0.060; ruby, 0.010; ferrite, 0.030; germanium, 0.050; and tool steel, 0.008. Successful impact grindings have produced delicate engravings in glass, gem stones, and mother-of-pearl as well as accurate dicing of semi-conductor materials. The tool will drill holes as small as 0.002-in. dia in ferrites, ceramics, and tungsten carbide.

List price of the new model is $1,875, including the generator.

Gulton Industries, Inc, 212 Durham Ave, Metuchen, NJ

MORE DATA? Circle 65, inside back cover

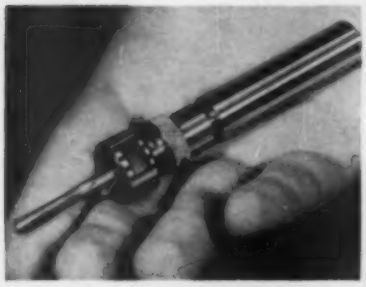
Speedlap 12-in. Lapper Gives Flatness to 3 Millionths Inch

This 12-in. lapping machine, the model 12, is constructed of stainless steel and has a Speedalloy reversible lap plate which is serrated on one side, solid on the other. The machine's four 4½-in. ID rings are said to eliminate much pre-grinding and to provide 49% greater lapping area. The stainless construction prevents contamination.

Typical production features are that the lapper produces flatness to 0.000,003 in. and better with surface finish of 2 rms, parallelism of 0.000,-050 in. tolerance.

Speedlap Corp, Dept 120, 3636 W Oakton St, Skokie, Ill

MORE DATA? Circle 63, inside back cover



Tap Holder Makes Tapper of Machines With Spindle Reverse

These tools, which may be used as either releasing or non-releasing tap holders on all machines with reversing spindles, convert, in effect, any machines on which they are used into precision tapping machines.

V-R INSERTS...

FIRST CHOICE of more and more plants

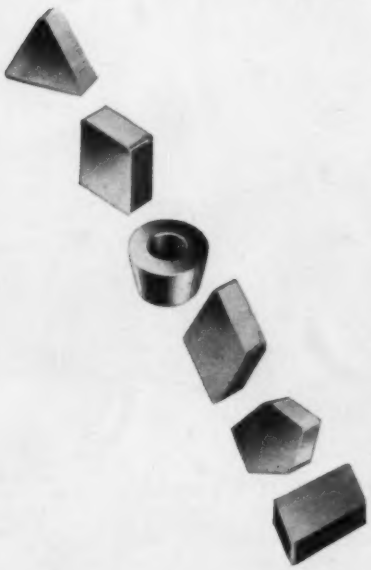
PUREST RAW MATERIALS enable V-R to produce the highest quality carbide grades.

MOST MODERN METHODS, such as vacuum sintering, make V-R grades better, more versatile.

PRECISE PRODUCTION PROCESSES assure accurate shapes, sizes, grades, dimensions and densities.

CONSTANT QUALITY CONTROL guarantees consistently superior performance from V-R inserts.

Contact your V-R representative or write us today for full information on the complete line of V-R Inserts, Toolholders and Face Mill Cutters.



...V-R INSERTS...BETTER FROM START TO FINISH...

CREATING THE METALS THAT SHAPE THE FUTURE

VASCOLOY-RAMET

810 MARKET STREET • WAUKEGAN, ILLINOIS

C-834

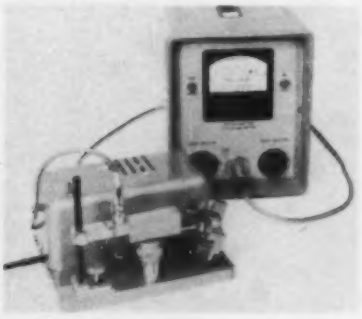
Cam-Operated Program Controller Introduced by Barber-Colman

Any variable which can be resolved into a millivolt signal can be controlled in almost unlimited patterns by the electronic, round-chart cam-operated unit. The controller precisely maintains predetermined time patterns. Full-scale rise can be accomplished in 30° rotation.

The cam contour is picked up by a cam follower arm. Position of the arm is transmitted through the Electronic Link to the set point which is connected to the control form. Permanent round chart can be removed at any time without interfering with the program cycle. A synchronous motor, equipped with a start-stop switch, drives the chart and cam; cam can be driven independently if desired.

Barber-Colman Co, Wheelco Industrial Instruments Div, Rockford, Ill

MORE DATA? Circle 66, inside back cover



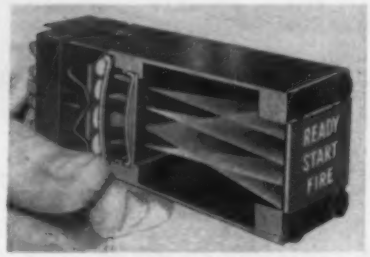
Profilometer Pilotor Checks Roughness of Curved Surfaces

Profilometer Type RE Rotary Pilotor provides a means for high production checking of average surface roughness in micro-inches around surfaces of rotation and across the radii of small parts, both internal and external. Both reciprocating and continuous tracing motion are provided, making the instrument adaptable to a wide range of parts. Surfaces of rotation or radii from approximately 1/32 in. to approximately 2 in. or more than can be handled easily. Selection of any desired arc of trade from 10° to 350°, with automatic reversals, has been provided.

Type RE is used in conjunction with a standard Profilometer Amplimeter and Tracer. Either arithmetical or rms average readings are possible.

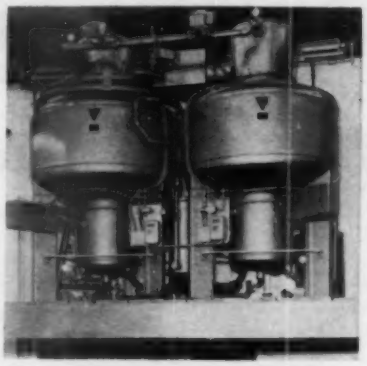
Micrometrical Mfg Co, 3621 S State Rd, Ann Arbor, Mich

MORE DATA? Circle 67, inside back cover



SUBMINIATURE READOUT incorporating colors, words, and backgrounds, makes it possible to display any words up to five letters individually or in combination, with or without color backgrounds. Colors can be displayed without words. Series 120,000, an aluminum-cased unit, is priced at $35—*Industrial Electronic Engineers Inc, 5528 Vineland Ave, North Hollywood, Calif*

MORE DATA? Circle 68, inside back cover



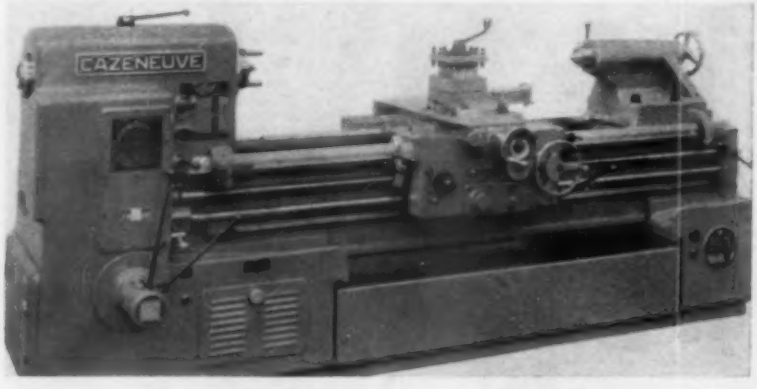
Solvent Vapor Recovery System Cuts Degreasing, Cleaning Costs

Vic's line of industrial vapor adsorbers is reported to have cut solvent costs by more than 50% in field-tested installations and to have reduced health hazards by removing undesirable solvent vapors from the atmosphere of adjacent areas.

Vapor Recovery System captures solvent vapors evaporating during degreasing and cleaning operations by ducting them into a specially designed tank with a bed of activated carbon, returning clear, reusable solvent after a steaming and decantering process. Systems are available in 11 different automatic and manual models for compact installation.

Vic Mfg Co, Industrial Div, 1313 Hawthorne Ave, Minneapolis 3, Minn

MORE DATA? Circle 69, inside back cover



Tracer Lathe Has Four-Way Tool Turret

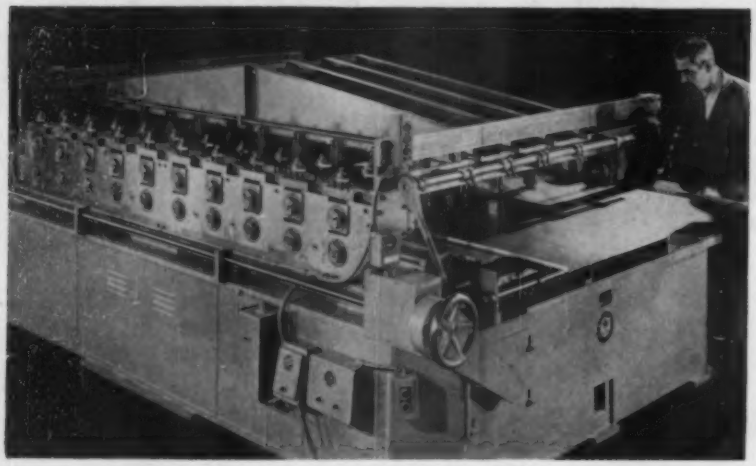
Model HB-575 tracer lathe—which is powered with a 12 hp motor and a multiple V-belt drive—is equipped with a taper and/or a copying attachment. Designed for precision operation, all shafts are mounted on anti-friction bearings and equipped with patented four-way tool turrets which are accurate to 0.0005 inches.

Lead and cross feed screws are ground for accuracy and smooth performance; all moving parts are automatically pressure lubricated.

Cazeneuve Lathes, Inc, 575 E Linden Ave, Linden, NJ

MORE DATA? Circle 70, inside back cover

At AUTONETICS, a division of North American Aviation, Inc....
Close tolerance jig boring
of intermediate gimbals
for N5G inertial autonavigators
in GAM-77 air-to-surface missiles...
means
Bores of .0002" diameter and within .0005"
in lineal dimensions, bored in three locations
at 0-90° and 180°, holding .0005" parallel
and .0005" concentricity.
Bores also held normal to each other
within .001" total internal radius.
and that means...
an economical production run on
LINDNER OPTICAL MEASURING
JIG BORER Model LB15
with exclusive Autopositioner
Your close tolerance jig boring
belongs on a LINDNER, too.
May we show you
all the reasons why?
KURT ORBAN
COMPANY, INC.
34 Exchange Place, Jersey City 2, New Jersey
CIRCLE 262 READER SERVICE CARD



ROLL FORMING MACHINE produces all steel panels 8 to 66-in. wide, forming both edges in one pass, at forming speeds of 40 to 120 fpm. It is equipped with 2 sets of roller dies permitting the production of two different types of panels in any of the many widths required—*Maplewood Div, Rockford Machine Tool Co, Rockford, Ill*

MORE DATA? Circle 81, inside back cover

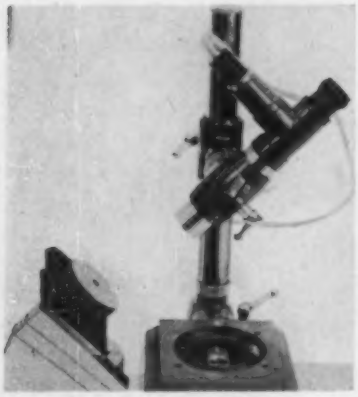
Air-Cooled Heliweld Holder Has 160-Amp Capacity

Airco H16-A, with 160-amp ac or dc continuous capacity, provides clean, smooth welding of thin gage aluminum, alloy and stainless steels, brass, copper, magnesium, molybdenum, nickel, silver, and other metals.

The 2⅞-in. head clearance permits its use in confined spaces. Variety of nozzle orifice sizes are available in 1¼ and 1⅝-in. lengths. Accessories such as collet cap assemblies, collets, and nozzles are interchangeable with those in the H35-B Heliweld holder, an Airco water-cooled model rated at 350 amp dc. Tungsten electrodes from 0.020 through 5/32 in. dia and from 2 to 7 in. in length can be handled, and argon, helium, or mixtures of argon and helium shielding gases can be used.

Air Reduction Sales Co, 150 E 42nd St, New York 17, NY

MORE DATA? Circle 84, inside back cover



Auto-Collimator Reads Angles In 2 Directions Simultaneously

The Minidekkor—a small, lightweight auto-collimator for workshop and toolroom use—measures angular displacements in two directions simultaneously, by comparison with a standard such as a gage block or polygon. The reading is obtained by observing in the eyepiece the position of a reflected crossline target in relation to a fixed scale graduated in minutes.

Readings can be taken direct to 1 minute of arc, and estimated easily to 30 sec.

Maximum recommended working distance is 12 ft, and max measuring range is 60 x 60 min of arc. Telescope tube is 1-in. dia, and instrument is 6 in. long, overall.

Applications include the checking of machine tools and machine tool setups, V-blocks, fixtures, gages and toolroom equipment, and angles on precision products such as plastic molds, dies, and fixtures.

Engis Equipment Co, 431 S Dearborn St, Chicago 5, Ill

MORE DATA? Circle 82, inside back cover

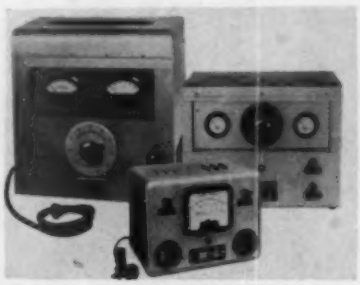
Collins Portable Thread-O-Matic Features Automatic Double Chuck

Model 22-A Thread-O-Matic threads a range of ⅛ to 2 in. in pipe and conduit, and ¼ to 2 in. in bolt. The machine is said to speed cutting time by 2 to 3 times, because it has a power-operated automatic double chuck. When a switch is turned, the chuck (front and rear) automatically grips and centers pipe. Turn the switch off and pipe is released.

Other features are: complete choice of mono, dual, or universal die heads with built-in automatic oil flow; offset cutter on carriage; interchangeability of position of cutter and reamer assemblies; lightweight permanent-mold aluminum casting.

Collins Machinery Corp, 955 Monterey Press Rd, Monterey Park, Calif

MORE DATA? Circle 83, inside back cover



Electroplating Power Units Plate by Tank or Brush Methods

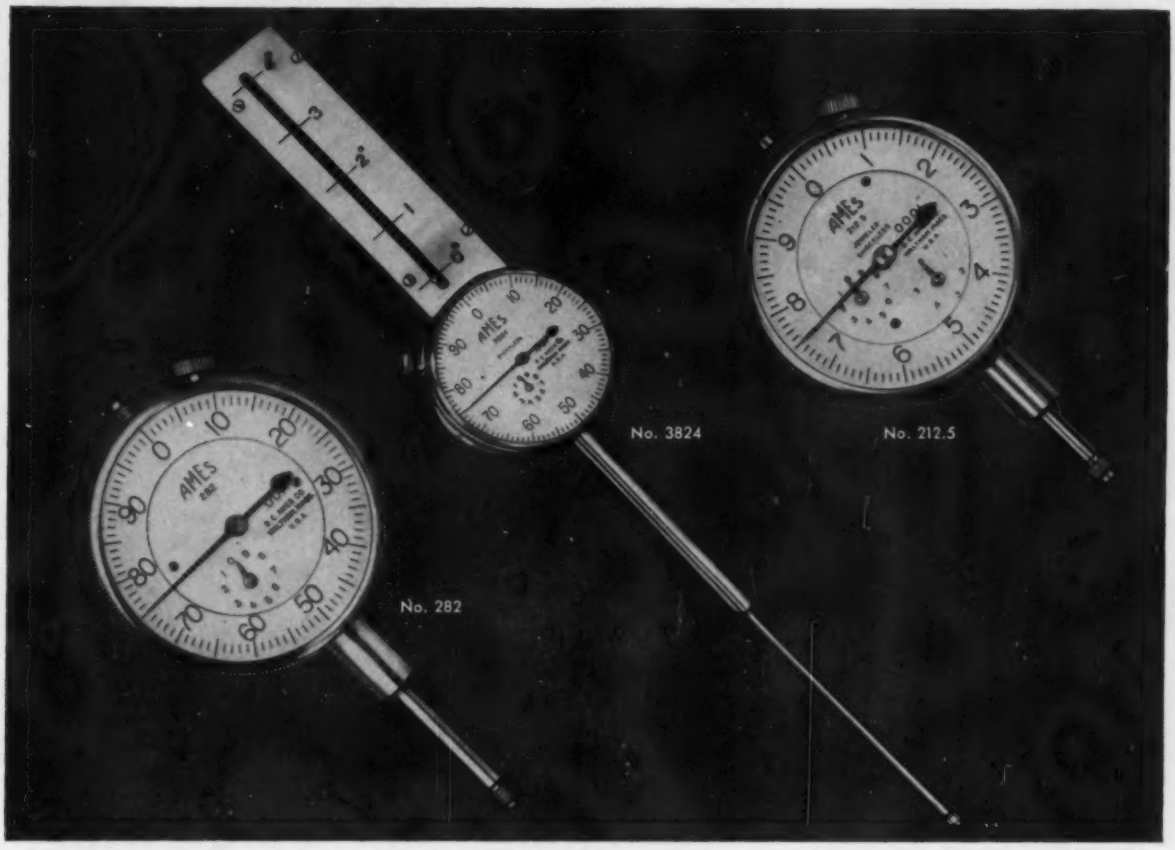
Three new units are available to cover a full range of plating operations from quantity production to customized experiments. Rated at 5, 10, and 50-amp capacity, each is capable of electroplating copper, cadmium, nickel, chrome, brass, silver, and gold by both tank and brush methods. Units require no special wiring or installation; they operate from a standard 110-120 v, 50-60 c, single phase ac current.

Units feature continuous range auto transformer to permit infinite control of current and voltage, plus automatic protection against overload and short circuits. Full wave rectification assures high efficiency at all times. Tested capacity ratings are conservative to provide an additional safety factor and ample power reserve.

Warner Electric Co, 1512 W Jarvis Ave, Chicago 26, Ill

MORE DATA? Circle 85, inside back cover

AMES *Masters of Measurement*



LONG-RANGE DIAL INDICATORS

Use Them for Checking: long slide travel, large cams, deep recesses or other dimensions requiring indicator spindle travel up to 12".

Features Include: large diameter dials, widely spaced dial graduations, movable dials, replaceable contacts and count hands.

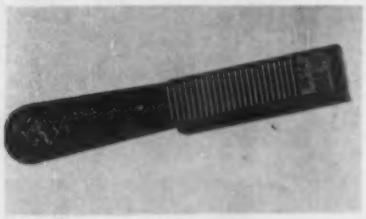
Attachments: rubber dust guards, tolerance hands, lift levers, special backs, contact points, etc.

For literally hundreds of measuring, indicating and comparing operations, you'll find Ames standard and customized gauges and indicators unerringly accurate and amazingly durable . . . *You're asking for the best when you specify Ames!*

B. C. AMES CO., Waltham 54, Mass. Representatives in Principal Cities — In Canada, H. C. Burton, Co., 166 Rebecca Street, Hamilton.

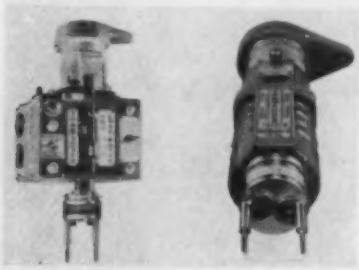
B.C. AMES CO.

MANUFACTURERS OF MICROMETER DIAL INDICATORS, DIAL GAUGES, ACCU-FLOW AIR GAGES, PORTABLE TRANSISTORIZED COMPARATORS



HONING LAP, rated for lappng and .toning with diamond quality, costs 70% less than diamond. Lap is said to handle all metals and materials including plastics and the hardest carbides. Four grits from 180 to 500 are available. Price is $8.75.—*Newtools Inc, Box 1, Amityville, NY*

MORE DATA? Circle 86, inside back cover



Adjustable 2-spindle Drill Head Has Capacity of ⅛ in. in Steel

Model 200 Multi-Drill, designed for close center multiple drilling and tapping work, may be mounted on any drillpress or drill unit to drill or tap two holes at one time. Spindles may be adjusted to drill or tap a wide variety of hole patterns in a 2-in.-dia circle.

For multiple tapping, the unit can be coupled to any of three Commander tapping heads; Standard, Lead-Matic, or Pneu-Matic. Special tapping spindles to increase the model's application include an adjustable depth spindle and a pitch compensating spindle. Adjustable depth spindle permits holding of fine adjustments through a range of 5/16 in. in steps of 0.001 in. Pitch compensating spindles permit simultaneous tapping with taps of different pitch.

Commander Mfg Co, 4225 W Kinzie St, Chicago, Ill

MORE DATA? Circle 87, inside back cover

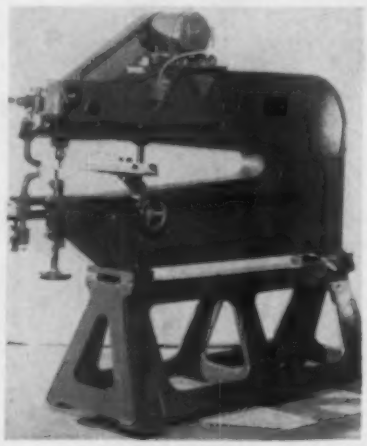
Ultrasonic Testing Instrument Checks Glass and Hard Rubber

As well as doing nondestructive testing of metals, the Model 424-D Immerscope will also inspect other reasonably elastic materials such as glass, hard rubber, and ceramics.

Special features of this new model include: built-in facilities for high-sensitivity, high-resolution contact testing; high-speed flaw alarm circuit; built-in recorder output circuits; built-in video delay circuit.

Princeton Div, Curtiss-Wright Corp, P O Box 110, Princeton, NJ

MORE DATA? Circle 88, inside back cover



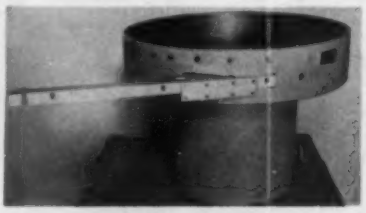
Japanese Vibro-Shear Cuts Most Shapes Without Special Dies

Called the Vibro-Shear, this Japanese import cuts segments, rings, and all shapes requiring specific arcs. In many cases, especially on short runs, it is said to eliminate the need for special dies, since all forming is continuous.

The machine is available in models with ⅛ to 25/64-in. capacities; model MT-4, illustrated, has a 3/16-in. capacity and 39-in. throat.

Dist by Headstrom Tool Co, P O Box 319, Montclair, NJ

MORE DATA? Circle 89, inside back cover



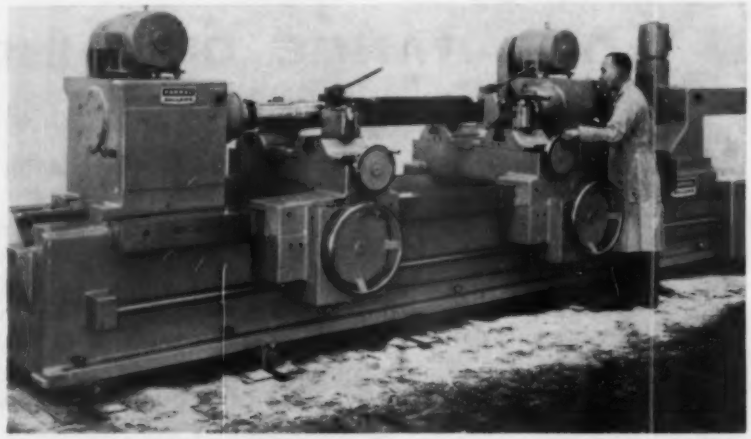
30-in. Parts Feeder Operates At up to 3000 Parts per Min

The 30-in. Disco-O-Matic is designed for feeding, orienting, and counting a large varity of objects at high speeds. It can be adapted for continuous feeding or for mechanical releasing of one or more parts at a time, or it can be set up for electronic counting or batching. Where gentle handling is required, the machine can be slowed down so as to give a comparatively high rate of feed while providing careful handling of fragile or delicate parts.

Machine can be provided with an adjustable track so that a large variety of shapes and sizes can be handled; it can be changed over from one size to another in minutes; large-diameter bowl permits handling of much larger parts; speed can be changed while unit is in operation.

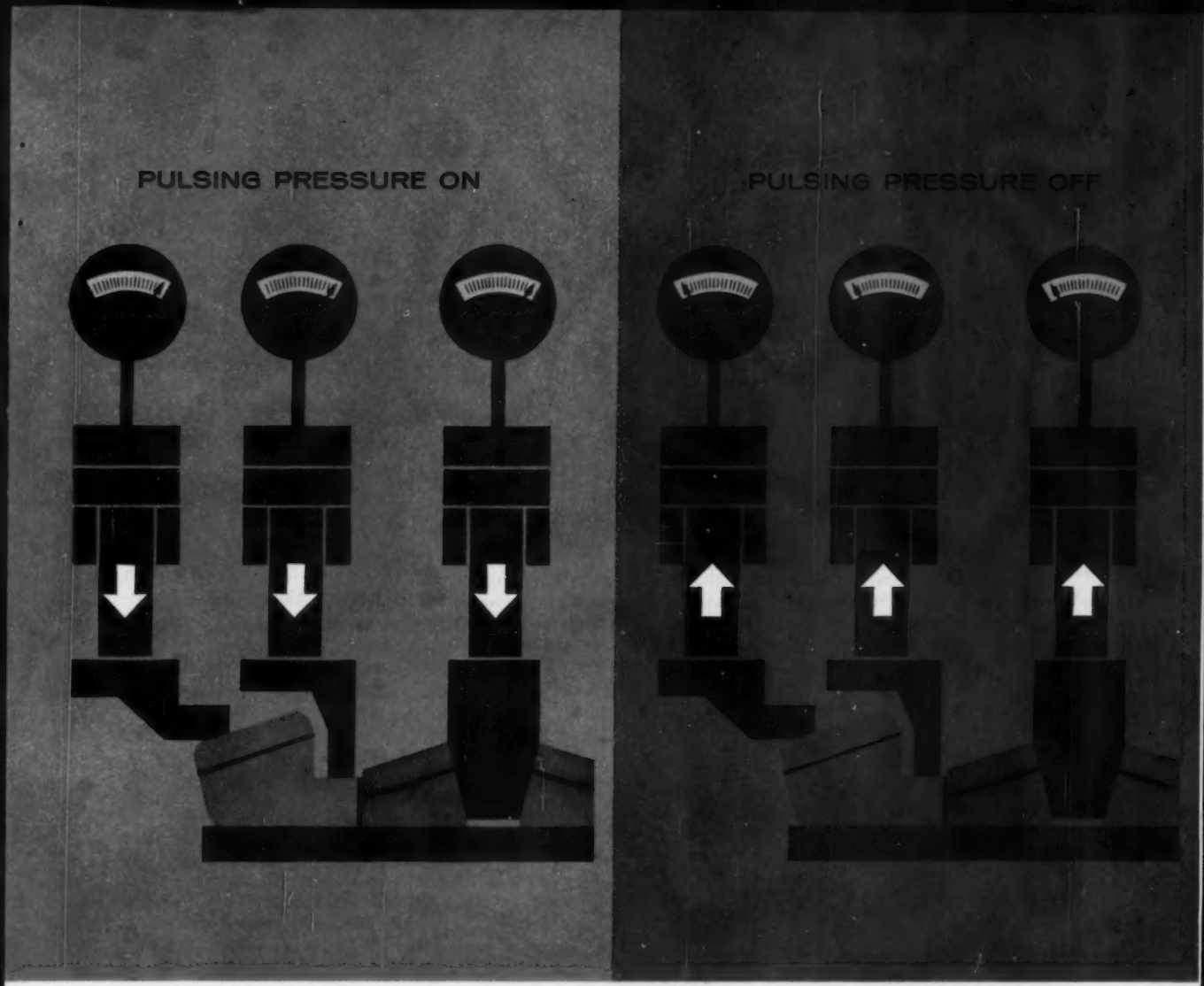
Count-O-Matic Inc, 40-26½ 22nd St, Long Island City, NY

MORE DATA? Circle 90, inside back cover



DUAL-END-DRIVE JOURNAL TRUING AND AXLE LATHE will rough turn, finish turn, and burnish either new or used car or diesel axles in standard AAR sizes from 3¾ x 7 in. up to 6½ x 12 in. Also, it will turn and burnish inside journals of mounted wheel sets with thread diameters up to 46 in., and turn center portion, between wheel seats, of either straight or tapered axles—*Farrel-Birmingham Co, Inc, Consolidated Machine Tool Div, 565 Blossom Rd, Rochester 10, NY*

MORE DATA? Circle 91, inside back cover



New Quenching Machine pulsates to eliminate distortion

The pulsing feature of the No. 529 Quenching Machine allows the use of high pressures to control distortion of parts under quench. Pulsing, which is a way of alternately applying and releasing pressure on the part, allows for the natural contraction of the part . . . and eliminates stresses in the part-die relationship.

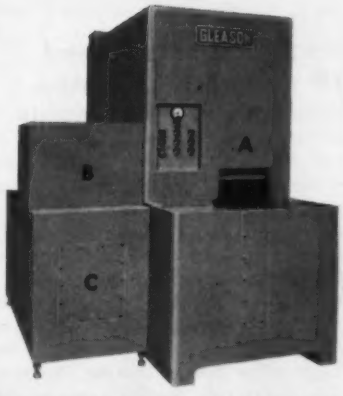
You get tremendous latitude in control of the quench, since as much as 200 gallons of oil can be pumped over the parts.

Simply preset the oil flow with valves and timers, and you have the following automatic cycle: start with a fast quench to set the part, switch to a lower rate; then finish with a rapid quench or vary the sequence any way you wish.

The hydraulic system has a maximum of 1000 pounds of pressure per square inch; a combined total of 50,000 pounds of pressure is available on this machine.

You can handle parts up to 10½ inches in diameter and 4 inches high in the No. 529 Quenching Machine. And it is available in three variations; by adding units as shown in the caption, production is greatly increased.

Drop us a card, and we'll send you more data on specifications and operation.

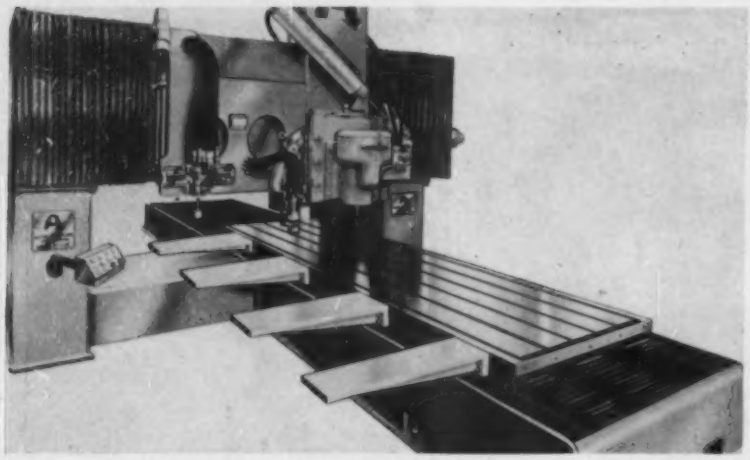


The basic No. 529 Quencher (A) is manually loaded and unloaded. Automatic unloading (B) is easily added. An auxiliary quench chamber (C) can be added for high production work.

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

CIRCLE 265 READER SERVICE CARD



MODEL P412 HIGH SPEED TWIST PROFILER, which is designed for adaptation to tape control, features reinforced cell construction normalized to relieve stresses, flat hardened and ground ways, bearing surfaces of sintered bronze impregnated with teflon, spray mist lubrication, neoprene way covers, and hydraulic motor-operated ball screw with anti-backlash nuts—*Arrow Engrg Co, Inc, Largo, Fla*

MORE DATA? Circle 76, inside back cover

Dip Solder Machine Offered For Circuit Board Assemblies

Assemblies can be dip-soldered to acceptable military requirements on the Hydro-Dip processing machine. After roll soldering or gold plating, the etched circuit board is ready to receive electronic components. With their leads trimmed and clinched against circuit paths, the assembly is fluxed and presented for dip soldering. This is accomplished by thrusting the board between preset carriage clips and actuating the cycle valve. Board then traverses forward, down into contact with the molten solder, and up again for discharge at the opposite end of the machine. Soldered joints are reported to be free of icicles and exhibit thorough wetting.

Machine is hydraulically powered at low operating pressure. Solder pot is 220/440 v and is equipped with a thermostat.

Associated Circuit Craft, PO Box 1664, Glendale, Calif

MORE DATA? Circle 77, inside back cover

Westinghouse Relay Designed For Automated Machine Tools

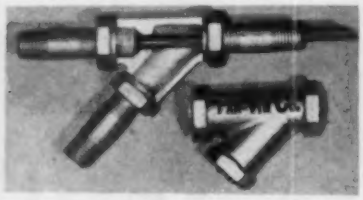
Designated the type BF relay, this compact relay will save up to 50% in control panel space, with attendant savings in floor space for machine control equipment. It was designed specifically for the automated machine tool industry.

Representing a new concept in relay design, the new unit is only 3⅛ in. high and 1 11/16 in. wide, occupying control panel area about the size of a cigarette lighter. It is available in any combination of normally open or normally closed contacts, from two to eight poles with a maximum of four normally closed. Rated full load current is 6 amp at 300 v ac.

Operating time on pickup is 12.5 to 18.0 millisec, and on dropout, 6.25 to 12.5 millisec.

Westinghouse Electric Corp, P O Box 2099, Pittsburgh 30, Pa

MORE DATA? Circle 78, inside back cover



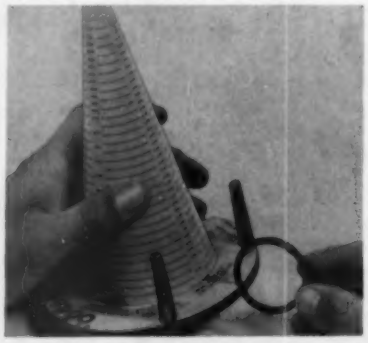
Single Return Water Line Fitting Directs Water to Any Die Portion

Style Y allows bringing cooling water directly to the area that is running too hot when it is impractical or impossible to have a through water line in a die or core. Cooling can be directed to such areas as gate, runner, and heavy casting sections, side core pull and set-in cores in ejector and on cover dies.

In operation water is directed through a copper tube that is inside the sand cast aluminum fitting. Copper tube extends into the area to be cooled. Water is returned in the area between the ID of the standard pipe and the OD of the copper tubing. It will operate at normal pressure.

Par-Vin Co, 29 Union St, Batavia, NY

MORE DATA? Circle 79, inside back cover



GAGE FOR O-RINGS allows users to check ID and cross section without manual or mechanical measuring. ID is measured by placing ring on cone, while cross section is measured with slots in base. List price is $3.50—*Parker Seal Co, Div of Parker-Hannifin, 10567 Jefferson Blvd, Culver City, Calif*

MORE DATA? Circle 80, inside back cover

Now... Sylvania cuts the price of automation

New, compact 44-station automatic transfer machine brings the benefits of automation within reach of most manufacturers.

It's about half the size of other top-quality transfer machines, far less expensive, too. What's more, it dovetails neatly into the trend to smaller and smaller products and assemblies by providing more stations per foot.

It's a machine that could be ideal for you if you make any product that involves several station-to-station operations.

WHAT IS A TRANSFER MACHINE?

It's automation's basic building block. It moves pieces-in-production from one tool or worker to another, stops the piece long enough so it can be bent, drilled, tapped, heated, measured, molded, riveted, coated, assembled, packaged, etc.

Sylvania makes several models of these basic machines. And if you do not have facilities, we can recommend reliable and experienced manufacturers of the necessary tools, jigs, etc., which you'll need in your automation program.

HOW TO AUTOMATE

That's a tough one. It varies almost with each manufacturing operation. Sylvania will provide free consultation to help with your particular problem but, in any event, there's one basic rule for almost every situation: *You must start with the best transfer machines if you're going to realize the full benefits of automation.*

Naturally, you pay more for the best. But a good transfer machine can last for 30 years or more. What's more, by changing tools and jigs, it can be adapted to almost any conceivable production operation. You can even change products without changing transfer machines.

WHERE TO BUY

Naturally, we're a bit biased, but we believe Sylvania transfer machines are the best on the market.

We've been building them for our own use for over 20 years, because we have never been able to buy one that met our accuracy standards for the manufacture of lamps, tubes, fine electronics equipment.

We make two general types—Rotary indexing chassis and Conveyor indexing chassis. Both have many exclusive features which contribute to their outstanding performance. And we also make 5 models of precision indexing transmissions of superior quality.

FREE HELP—AND INFORMATION. If you're thinking of automating, we'd be glad to have one of our automation sales engineers call on you with his suggestions and advice. Or, if you'd like more details on Sylvania transfer machines, send for our free brochure.

SYLVANIA LIGHTING PRODUCTS
Equipment Development Plant
121 Loring Avenue, Salem, Mass.

Please send me free brochure of:

☐ Rotary ☐ 44-Station Conveyor and 80-Station Conveyor ☐ Transmissions

Name_____

Position_____

Company_____

Address_____

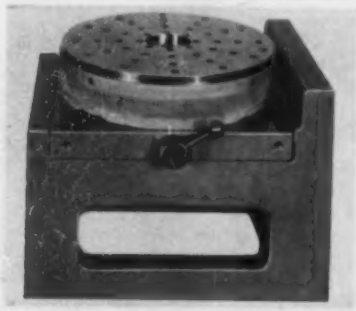
City_____ Zone_____ State_____

☐ PLEASE HAVE SALES ENGINEER CALL FOR APPOINTMENT

SYLVANIA

SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM



Michigan Rotary Indexing Table Accurate to ¼ Second of Arc

This new 7-in. diameter Milichex rotary indexing table provides whole-degree angular indexing to an accuracy within ¼ second of arc (equivalent to 12 millionths in. at 20 in. dia). Designed for smaller work, Model MX-3600-7 in. is identical in operation to the larger models introduced recently.

Table top and base each have 360 ground and lapped teeth that mesh for positive positioning and locking. In operation, a lever is shifted to raise table; top is then rotated to the desired angular position (indicated by scale), and lever is returned to its original position, lowering and locking the table. Table locks automatically into exact position.

An optional version Model MX-3600R with right-angle base permits using the Milichex either horizontally or vertically. As a rotary indexing table it can be used for machining or inspecting.

Michigan Tool Co, 7171 E McNichols Rd, Detroit 12, Mich

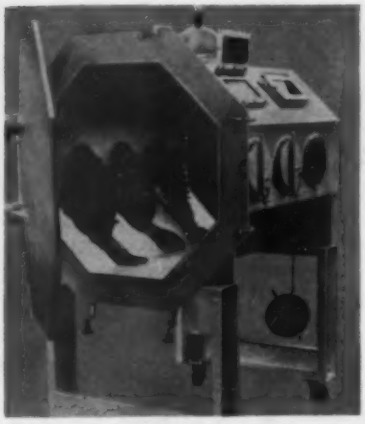
MORE DATA? Circle 71, inside back cover

a self-contained hydraulic system.

Large platens (20-in. wide x 27½-in. high) at each molding position provide 550 sq in. of mold area, and the 13-in. max stroke of the clamping cylinder gives 28 in. of daylight.

F J Stokes Corp, 5500 Tabor Rd, Philadelphia 20, Pa

MORE DATA? Circle 72, inside back cover



Vacuum Dry Box Said a Complete Inert Atmosphere Room on Wheels

This portable inert gas room provides space for working in a rare gas for inert atmosphere welding, for poisonous substances, or with explosive and hazardous materials. It can be evacuated to 50 microns with a leak rate of 1 micron a minute. It is equipped with low-permeability Butyl gloves.

Controlled Atmosphere Enclosures Mfg Co, P O Box 3693, Jacksonville 6, Fla

MORE DATA? Circle 73, inside back cover

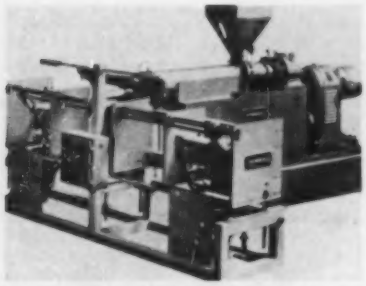
Vibrator Tilts for Rinsing While Still Vibrating

Model HD-1016, a 1 cu-ft unit that can be tilted for rinsing while still vibrating permits faster and more thorough rinsing operation. A rinse cover, incorporating Lorco's manifold system of spraying the water throughout the work is included with the machine. In combination with a special punch plate screen to fit the top of the bowl, the vibrating-while-tilted feature facilitates separation of fine or fractured chips from the rest of the media and, in some instances, can be used to separate parts from media.

Machine is 10 in. wide, 16 in. long, and 13 in. deep with ½-in.-thick rubber lining throughout. It contains a variable amplitude shaft adjustable from 0-¼-in. amplitude. Frequency is variable within a range of 700 to 2100 cpm.

Lord Chemical & Equipment Div Wheelabrator Corp, 2068 S Queen St, York, Pa

MORE DATA? Circle 74, inside back cover



Stokes Blow-Molding Machine Makes Parts up to 5-Gal Size

Model 856 dual-manifold blow-molding machine molds plastic products as large as a five-gallon container.

Using the full output of a 3½-in. extruder, the machine gives five tons of clamping pressure at each of the two molding positions. Normally, this clamping pressure is produced by

IMPREGNATING MACHINE SETS ROUGH CASTING of aluminum V-8 block in fixture where it is hydraulically clamped, tipped to 90°, and locked into place. Then, cavity to be impregnated is sealed and solution is pumped in and pressurized. Machine shown has 4 individually operated fixtures for 2 different parts —*Turner Bros, Inc, 2625 Hilton Rd, Ferndale 20, Mich*

MORE DATA? Circle 75, inside back cover

12 NEW GRINDERS in a power range all their own!

Now! You can choose the abrasive tools that best fit your needs from 138 sizes and types of Ingersoll-Rand Grinders.

features

- **Sensitive Weight-Type Governor**—prevents overspeeding, assures positive, accurate speed control.
- **Improved Muffling**—15 decibels quieter than comparable tools.
- **Built-In Lubricator**—automatic motor lubrication increases tool life.
- **Built-In Air Strainer**—protects motor.
- **Rubber-Faced Throttle Valve**—unaffected by moisture, dirt and rust.

New Series 15 Grinders

- **Speed—6000, 9000, 12000 and 15000 rpm**
- **Weight—6½ lbs.**
- **Length—16⅝ ins.**
- **Grip or straight handles with lever or thumb throttles**

Twelve new Ingersoll-Rand grinders in a completely new size and power range! These small, high-performance grinders are specifically designed to fill the need for light weight, easy-handling tools that will hold their speed under load on a wide variety of difficult grinding and buffing jobs.

Series 15 Grinders fill the bill—and offer manufacturers important new proof of tools to increase Annual Dividends on Payroll Dollars.*

215A-8

*Ask your AIRengineer for a convincing on-the-spot demonstration of how these new grinders—as well as all other Ingersoll-Rand air tools—can earn an Annual Dividend on your Payroll Dollars.

Ingersoll-Rand
11 Broadway, New York 4, N. Y.
Planned Annual Retooling increases output per man

New steels are born at Armco

Here's one of many reasons controlled uniformity in Armco

why you get Stainless Steel Bars

For Durability, Strength and Economy

This is an "electronic bathtub" for Armco Stainless Steel bars. It is called an immersion ultrasonic flaw detector. A subsurface defect or discontinuity, that would show up only after expensive machining, triggers electronic devices that ring bells, flash lights, and draw pictures on a scientific TV screen. When specified, Armco Stainless Steel bars for critical aircraft, nuclear or missile parts are 100% inspected in the Immerscope.

At every step in producing stainless steel, Armco uses up-to-date special inspection and control methods to be sure you get bars of controlled uniformity. That's why you will find Armco Stainless gives you maximum production at lowest cost with fewer tool adjustments and expensive rejects.

On all your stainless jobs, short run or high production, make sure of top profit by using Controlled Uniformity Armco Stainless Steel bars. Write us, or contact your Distributor of Armco Stainless Steels for information on prices and delivery. Armco Division, Armco Steel Corporation, 1801 Curtis Street, Middletown, Ohio.

Get Armco Stainless Steels from these Steel Service Centers

(A) Sheets, Strip and Plates (B) Bars and Wire

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BROWN-WALES COMPANY (AB)
Cambridge, Mass. – Auburn, Maine – Worcester, Mass.

CENTRAL STEEL & WIRE COMPANY (AB)
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CHICAGO STEEL SERVICE COMPANY (AB)
Chicago, Ill.

CLEVELAND TOOL & SUPPLY COMPANY (B)
Cleveland, Ohio

THE CONGDON AND CARPENTER COMPANY (AB)
Providence, R. I. – Fall River, Mass.

C. A. CROSTA, INC. (A)
Denver, Colo.

DUCOMMUN METALS & SUPPLY COMPANY (AB)
Los Angeles, Calif. – Berkeley – Phoenix – San Diego – Seattle

EDGCOMB STEEL & ALUMINUM CORP. (AB)
Hillside, N. J.

EDGCOMB STEEL COMPANY (AB)
Philadelphia, Pa. – Charlotte, N. C. – Greensboro, N. C. – York, Pa.

ESCO CORPORATION (AB)
Portland, Oregon – Denver – Emeryville, Calif – Eugene, Oregon – Honolulu – Los Angeles – Seattle – Spokane – Vancouver, B. C.

PETER A. FRASSE & COMPANY, INC. (AB)
New York, N. Y. – Buffalo – Hartford – Lyndhurst, N. J. – Philadelphia – Syracuse

FIRTH BROWN STEELS LTD. (AB)
Montreal, P. Q. – Toronto

GATE CITY STEEL, INC. – OMAHA (A)
Omaha, Nebr.

INDUSTRIAL STAINLESS STEELS, INC. (B)
Cambridge, Mass. – Buffalo, N. Y.

EARLE M. JORGENSEN COMPANY (AB)
Los Angeles, Calif. – Dallas – Denver – Honolulu – Houston – Oakland – Phoenix – Seattle – Tulsa – Wichita

MAPES & SPROWL STEEL COMPANY (AB)
Union, N. J.

METAL GOODS CORPORATION (AB)
St. Louis, Mo. – Dallas – Denver – Houston – Memphis – New Orleans – N. Kansas City, Mo. – Tulsa – Wichita

MONCRIEF-LENOIR MFG. COMPANY (AB)
Houston, Texas – Dallas – Harlingen – Lubbock – San Antonio – Temple

MORRISON STEEL COMPANY (AB)
New Brunswick, N. J.

THE ORLEANS STEEL PRODUCTS COMPANY, INC. (A)
New Orleans, La.

WILLIAM M. ORR COMPANY, INC. (AB)
Pittsburgh, Pa.

PAPER-CALMENSON & COMPANY (A)
St. Paul, Minn.

RICHARDS & CONOVER STEEL & SUPPLY COMPANY (A)
Kansas City, Mo.

SEABOARD STEEL & IRON CORP. (B)
Baltimore, Md.

SENECA STEEL SERVICE, INC. (AB)
Buffalo, N. Y.

SOUTHER STEEL & ALUMINUM COMPANY (A)
St. Louis, Mo.

J. M. TULL METAL & SUPPLY CO., INC. (AB)
Atlanta, Ga. – Birmingham – Greenville, S. C. – Jacksonville – Miami – Tampa

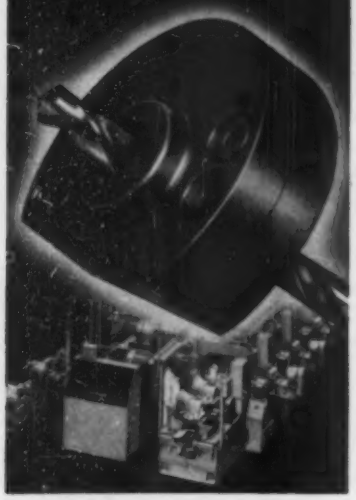
VIKING STEEL COMPANY (AB)
Cleveland, Ohio

VORYS BROTHERS, INC. (AB)
Columbus, Ohio

YORK CORRUGATING COMPANY (A)
York, Pa. – Washington, D. C.

ARMCO Armco Division

NEW
BROKEN TOOL DETECTOR



"Detect-A-Tool" is the new space saving solution to the problem of detecting tool breakage on automatic machine tools and transfer lines.

Expensive probe stations are eliminated as well as their attendant maintenance cost and floor space requirements, as the "Detect-A-Tool" is mounted on the work station itself.

Since the tools are checked each time they are used, tool failure is detected immediately and scrap losses from tool failures are eliminated.

"Detect-A-Tool" equipment can be easily installed on both old and new equipment. There are no complex moving parts to wear or get out of order, and little or no maintenance is required. Coolants, oils, or chips will not affect operation in any way.

"Detect-A-Tool" units are presently available for tools having effective diameters from 3/32" to 3/4".

This equipment features the same rugged construction and conservative electrical design that typifies all "MEK" products.

Complete "Detect-A-Tool" descriptive literature will be sent on request.

Manufacturers of
- *Electronic and Magnetic Controls*
- *Motor Control Centers*
- *Fabricated Electrical Enclosures*

MEK
Machinery Electrification, Inc.
62 Hudson St., Northboro, Mass.

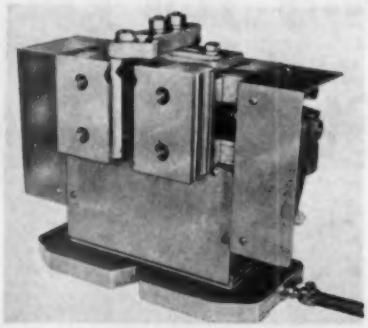
Quick-Change Devices Speed Setups On Automatic Wire Stripper

New features incorporated in Model 810A are designed to simplify setup changes and eliminate need for hand tools. They include a dial indicator on the measuring device; slide lock to hold feed rolls in place on keyed shafts; quick-release clamps to hold strip assemblies in place; switch-operated air valve; knurled disks on micrometer nuts and guide bushings to eliminate wrenches; and an air-operated wire straightener that automatically opens and closes to positive stop, obviating the need for adjustment each time wire is threaded through the machine.

The air-powered and electrically controlled machine cuts and strips 32 to 12 AWG wire in lengths from 1 in. to 300 ft at speeds up to 8000 pieces per hr. It can be used to strip Teflon, fiber glass, asbestos, and Kel-F as well as PVC, rubber, and other soft insulations. Designed principally for single conductor wire, it will also strip coaxial cable and certain sizes of rip cord.

Eubanks Engrg Co, 260 N Allen Ave, Pasadena, Calif

MORE DATA? Circle 100, inside back cover



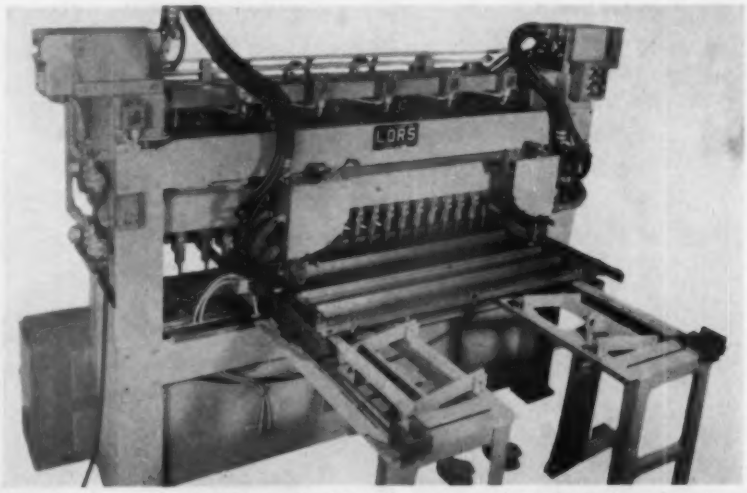
Self-Centering Work-Holding Jig Operates From Shop Airline

The Sure-Center air vise consists of two movable gibbed master jaws working from levers connected to an accurate cam which will repeatedly center a piece part within 0.0015 in. or better. Jaws can be set to drill the mean-center, as well as for accurate center drilling.

Features include instantaneous operation, visibility, and adequate chip room. Holding force is over 5500 lb at 100-lb line pressure; maximum jaw opening is 2½ in. Operation is by pedal, hand valve, or valve tied in with automatic equipment.

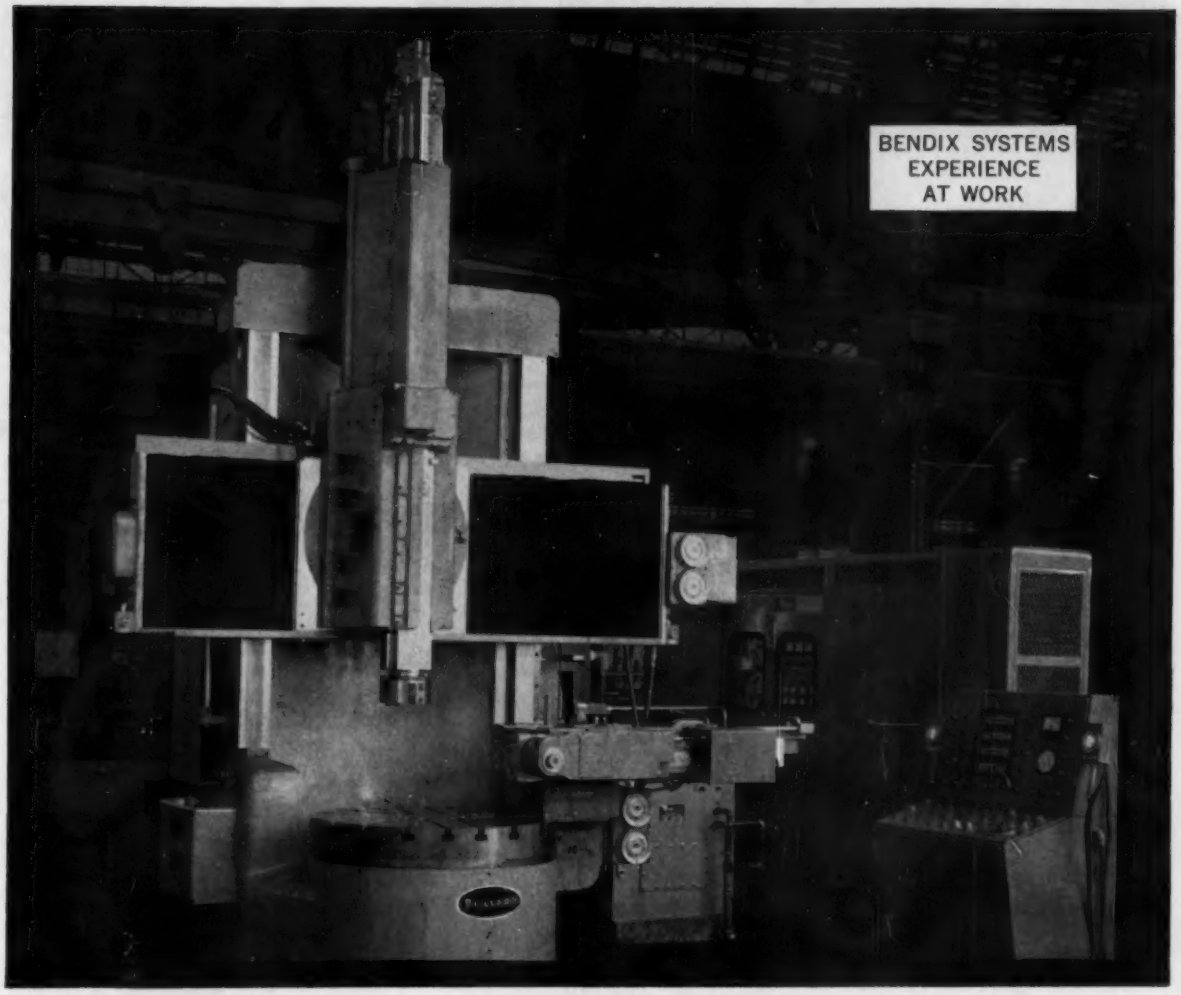
Heuser Mfg Co, 1638 N Paulina St, Chicago 22, Ill

MORE DATA? Circle 101, inside back cover



MODEL 240, 70KVA STEEL DESK TOP WELDER completes both the edge channels and stiffeners of a desk top in one min. Machine which has 24 electrodes, will handle a desk top any width and up to 96 in. long—*Lors Machinery Inc, 72 Delavan St, Brooklyn 31, NY*

MORE DATA? Circle 102, inside back cover



BENDIX SYSTEM ENGINEERING PROVIDES OPTIMUM NUMERICAL CONTROL FOR TURRET LATHE

Shown above is a Bullard four-axis vertical turret lathe equipped with Bendix DynaPath-14 contouring control unit. In this application, the selection of tools and spindle speeds is programmed, as is the motion of both slides.

Bendix application engineers, with accumulated experience in mechanical and hydraulic analysis of machine tools, worked closely with Bullard to produce this wedding of machine tool and numerical controls. And Bendix systems experience gained in working on other contour turning applications (with such companies as Ex-Cell-O, Heald, and Giddings & Lewis) assures the user correct application of control unit to machine tool.

In addition to contour turning applications, Bendix engineers numerical control systems for milling, grinding, drilling and jig boring machines. We have developed and applied controls to 2-, 3-, 4-, and 5-axis systems, both continuous path and point-to-point. These controls are being used daily in plants across the country to increase machine tool efficiency, reduce lead times, and make parts of consistently high accuracy.

Bendix SYSTEMS EXPERIENCE can provide the key to your machine tool problems. The right Bendix numerical control unit can be the profit-maker you've been looking for. Start putting Bendix application engineering experience to work for *you*—write today for a copy of our catalog number 308.

BENDIX PROVIDES SYSTEMS EXPERIENCE

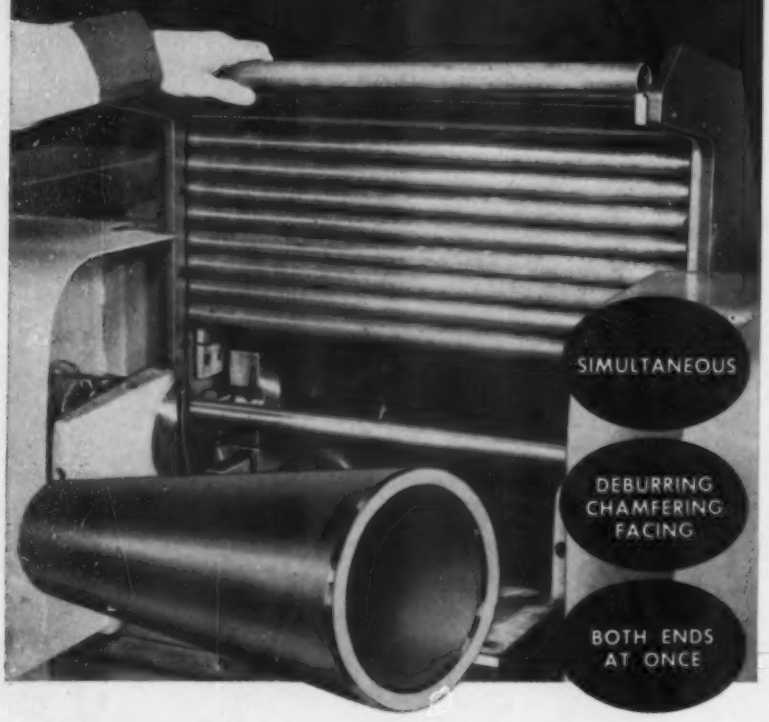
JUSTIFICATION STUDIES • SYSTEM ENGINEERING • TRAINING AND SERVICE

Industrial Controls Section

21820 Wyoming Ave., Detroit 37, Michigan

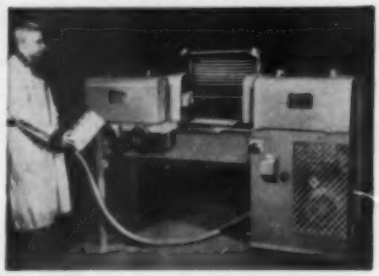
THE Bendix CORPORATION

ANNOUNCING NEW PINES
DOUBLE-END FINISHING MACHINE



HIGH PRODUCTION • ACCURACY • FLEXIBILITY

Filling the need for high production speeds and low unit costs, the new Model 666 Double-End Finishing Machine produces up to 1500 finished pieces an hour, holding length tolerances within .005". This new standard machine performs simultaneous inside-outside deburring, chamfering and facing, or light forming operations on both ends of tube, pipe, or rod. Workpieces are handled in diameters from ½" minimum to 3" maximum in lengths up to 60" on the standard bed machine, up to 120" on the extended bed machine. Operation is completely automatic with workpieces fed into machining position by the hydraulically operated Chute-Matic feed. Setup is fast with precision control of each machine function, easy adjustment to specific work length, and quick-change tool holders. Tooling is inexpensive with throw-away carbide bits. Special tooling arrangements are available to accommodate dedimpling. Find out now how this machine can help you produce parts faster, and at less cost.



WRITE TODAY FOR COMPLETE INFORMATION.

'61

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

672 WALNUT • AURORA, ILLINOIS

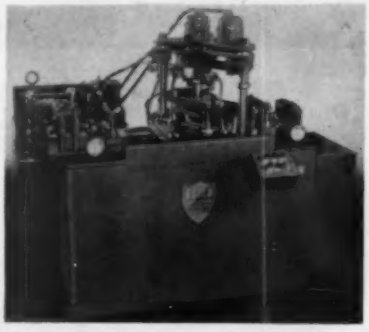
PRODUCTION BENDING • DEBURRING • CHAMFER MACHINERY

Medium-Duty AC Arc Welder Furnished in Portable Model

Model M18 T-1 is designed for small-scale production and maintenance applications. The 180-amp unit is mounted on heavy-duty wheels. Full 80-v open circuit voltage permits welding with all types of electrodes from 1/16 to 3/16 in. dia. An automatic balance volt-arc feature provides a deep penetrating arc at high ampere settings and a soft arc at low settings for light gage metals. The 15 to 180-amp range is covered in 15 steps.

Metal & Thermit Corp, General Offices, Rahway, NJ

MORE DATA? Circle 103, inside back cover



Automatic Shear and End Welder Has Fast Cycle Capacity

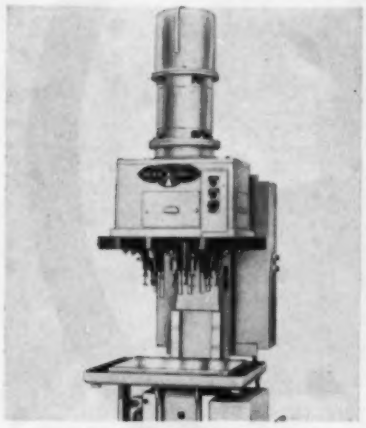
The RD-907, a rocker-die combination unit, utilizes the mash seam process to join coil strip ends for continuous processing lines. Complete operation time for clamping, shearing, and welding will range from 15 to 25 seconds, depending upon material thickness and width, reportedly increasing production as much as 30%.

The machine welds continuously from edge to edge of the strip, resulting in a joint with parent metal strength which can be used in slit-

ting, roll forming, tube manufacturing, coil build-up, annealing and paint lines without damage to knives or rolls. Unit is delivered complete with hydraulically operated entry and exit strip clamps, die-set shear, weld clamps, weld travel unit, indexing platen, and seam-welding control panel. Gaging, indexing, and welding operations are automatic and do not require an experienced operator.

Guild Metal Joining Equipment Co, 7280 Wright Ave, Bedford, Ohio

MORE DATA? Circle 104, inside back cover



14-Spindle Tapping Machine Performs 60 Cycles Per Minute

The Deka Drill No. HST-714 operates at up to 60 c per min at 1600 rpm. Spindles are adjustable in any pattern within a head area of 7¾ x 12¼ in. A larger area can be reached by using adjustable outboard bearing spindles, and a templet cluster box with slip spindles can also be provided.

The tapper is driven by a specially built reversing motor, capable of 240 empty plug reversals a minute, mounted by direct drive to the gearbox. Motor reverses electrically without need of brake or clutch. The hydraulically operated table can be set to handle various depths within a 6-in. stroke. Stroke can be held at the top of the cycle, leaving room for manually lowering the table whenever necessary. Table and knee assembly can be adjusted over a 14-in. distance on the column. Cycle selector switches permit the operator to raise and lower the table manually during setups or perform either a single cycle (for checking the workpiece), or set for automatic.

Precision Tool & Mfg Co of Illinois, 1305 S Laramie, Cicero, Ill

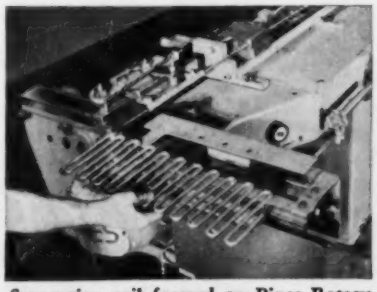
MORE DATA? Circle 105, inside back cover

IF YOU MAKE PARTS LIKE THESE...

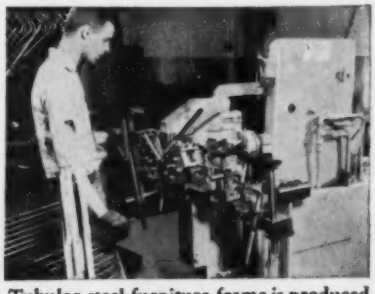
YOU CAN SAVE BY BENDING!

By production bending the "Pines-way," hundreds of metalworking plants are now benefiting from the cost-cutting advantages of cold-bending tubing, pipe, extruded or rolled shapes into parts similar to those above. Parts are produced faster, with smooth, strong bends. This means improved product quality at reduced costs.

A wide range of bending on large or small work, long- or short-run jobs, is easily accomplished by a complete line of standard Pines Bending Machines. Hydraulic power and automatic operation provide maximum accuracy, efficiency, and economy. Find out today, without obligation, how these machines can produce your parts at less cost.



Serpentine coil formed on Pines Rotary Machine at 900 bends an hour with 8% material savings, reduced assembly costs.



Tubular steel furniture frame is produced on a Pines Bending Press at the exceptional rate of over 2000 bends an hour.

WRITE TODAY FOR CATALOG AND DATA SHEETS

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

672 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFER MACHINERY

NEW . . . . . .

MODEL 136B-2

. . MASTER COMPARATOR

The best thing about this high-precision electronic Comparator is its accuracy and operating convenience. The next best thing is its amazingly modest price*!

The Model 136B-2 measures any master ring from .040" to 4.760" and any master disc up to 3.500" with repetitive accuracy to within two millionths of an inch! It measures with constant force, frictionless response, requires no warm-up.

This Horizontal Master Comparator is in a class by itself. It is one of the very few having the inherent design capability of **properly** and **reliably** checking Class XX masters, yet is far lower in price than **any** other high precision master comparator.

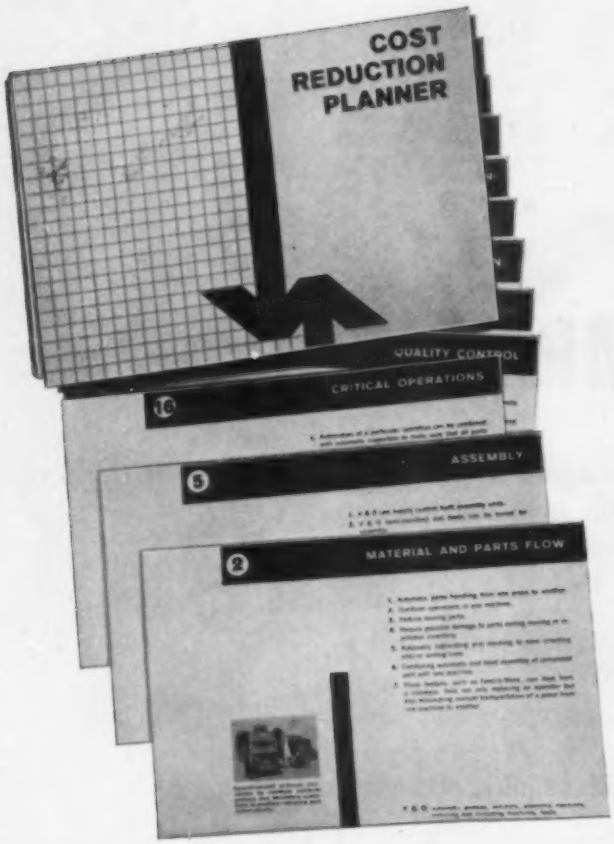
This is only part of the story. Send for full details.

FEDERAL PRODUCTS CORP.
1124 Eddy Street, Providence 1, R. I.

*$1950. plus Jaws @ approx. $100. per pr. (Complete set, 7 prs.)

Ask **FEDERAL®** *First*

for recommendations in modern gages... Dial Indicating • Air • Electric or Electronic — for inspecting, measuring, sorting, or automation gaging.



Cost reduction in small parts production is our business. Let us discuss the 16 areas in which V & O presses, press tooling, dial feeds, and special units can be of help. Just a few minutes going over the above Cost Reduction Planner with one of our men could lead to dramatic savings. Ask to see a representative by contacting Emhart Manufacturing Company, Hudson Division, Hudson, N. Y. It could be one of the most important requests you'll make this year.

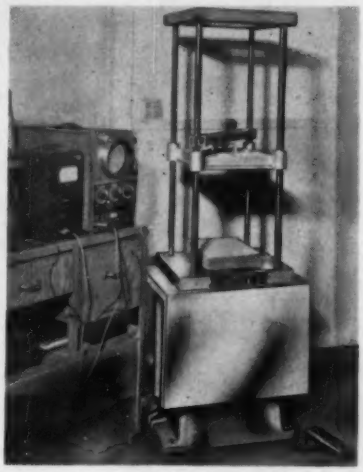
EMHART

COST REDUCTION IN SMALL PARTS PRODUCTION

Ten minutes with an Emhart rep may uncover a hot new cost reduction plan in one or more of these areas:

1 PRODUCT DESIGN
2 MATERIAL AND PARTS FLOW
3 PACKAGING
4 FABRICATION
5 ASSEMBLY
6 DIRECT LABOR
7 INDIRECT LABOR
8 METHODS SIMPLIFICATION (PEOPLE)
9 METHODS SIMPLIFICATION (MACHINES)
10 QUALITY CONTROL
11 IN-PROCESS INVENTORY
12 MAINTENANCE
13 FLOOR SPACE
14 SPARE PARTS INVENTORY (CUSTOMER)
15 SPARE PARTS INVENTORY (V & O MACHINES)
16 CRITICAL OPERATIONS

V & O
AUTOMATIC PRESSES AND FEEDS



Dynamic Cushion Drop Tester Tests Material Up to 12 in. sq

Designed for evaluating package cushioning material before use in product shipment, No. 12-CDT consists of a four-corner guide-post support assembly, an adjustable cross head and solenoid-operated release mechanism, a rigid aluminum alloy drop head, and a solid steel plate.

The drop head, guided by low friction linear ball bearings, can be electrically released from any height up to 32 in. max. Provisions are made for mounting a sensing device in the center of the head. Bench area is 19 x 19 in. The device is applicable for testing in accordance with ASTMD 1596-5?T.

Gaynes Engrg Co, 1648 W Fulton St, Chicago 12, Ill

MORE DATA? Circle 106, inside back cover

Optional Duplex Tables Minimize Setup Time on Planers

Duplex tables, available as an optional feature on the Flying Scot small planer, allow work to be loaded on one section of the table at the same time that work is being planed on the other section. Tables are quickly shuttled back and forth, making it unnecessary to shut off the planer at any time.

G A Gray Co, Dept A, Cincinnati 7, Ohio

MORE DATA? Circle 107, inside back cover

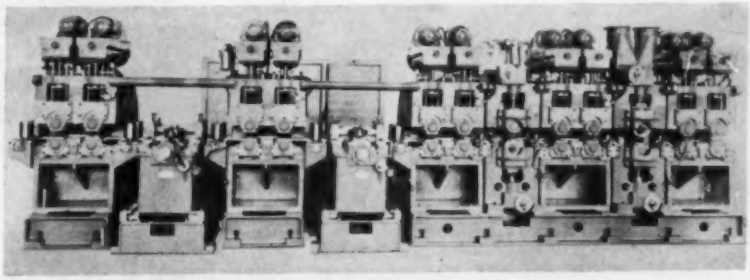
Imported Electric Hand Tool Designed for Removing Burrs

The Lesto Ges 95 A electric angle grinder is said to have particular application in foundries for trimming castings and cutting risers, in welding plants for removing burrs, in body building workshops for eliminating welding seams or minor projections on bodies or chassis, and in any operation involving the removal of small profile steel.

Driven by a 1.6 hp universal motor encased in a die cast housing, the grinder has a no load speed of 6500 rpm and comes in six different voltage models for ac and dc. It takes disks with OD up to 7 in. and up to ⅜ in. thick. Weight of tool with two rubber grip handles is 15 lb.

Dist by Victor J Krieg Inc, P O Box 7, Mamaroneck, NY

MORE DATA? Circle 108, inside back cover



MODEL NO. 1949 MILLING MACHINE mills copper bus bars and other nonferrous bars up to 6 in. wide. It mills all four surfaces in one pass, and is designed to handle hot-rolled copper bars up to 1 in. thick and 6 in. wide, with a max cross sectional area of 3 sq in., at speeds from 33 to 99 fpm—*The Torrington Mfg Co, Torrington, Conn* MORE DATA? Circle 109, inside back cover

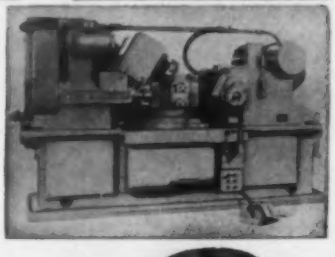
ALL ENDS OF PARTS
Completely Finished
"1·2·3"
ON THE
GOSS *and* DeLEEUW
Automatic Chucking Machine
in 1 SET-UP

This recent Goss & DeLeeuw development has already received universal acclaim as an outstanding achievement.

In speed, ease of tooling and precision finishing, the "1-2-3" chucker provides engineering advantages which result in vastly greater production at a fraction of parts' costs by other methods.

Easy, fast change-over from job to job makes this machine ideal for short-run requirements. Sturdy construction, power and speed make its advantages also apparent on long runs.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence — a method exclusive with Goss & DeLeeuw and offered on this machine.

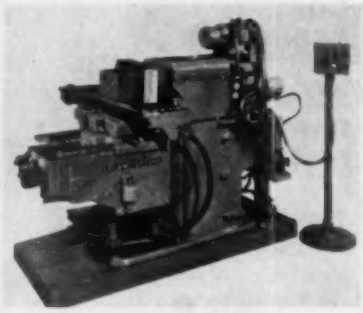


Illustrated literature available promptly on request. Send samples of your work for time and cost estimates.

GOSS & DeLEEUW
QUALITY PRODUCT-QUANTITY

GOSS *and* DE LEEUW
MACHINE COMPANY, *KENSINGTON, CONN., U.S.A.*

NEW SHOP EQUIPMENT



Knee-Type Gun Drill Furnished With Hydraulic or Leadscrew Feed

Designed for drilling in ferrous or non-ferrous materials, using carbide-tipped drills, this model is offered with either self-contained hydraulic feed or leadscrew feed gun drilling unit. Knee-type setup eliminates expensive fixturing.

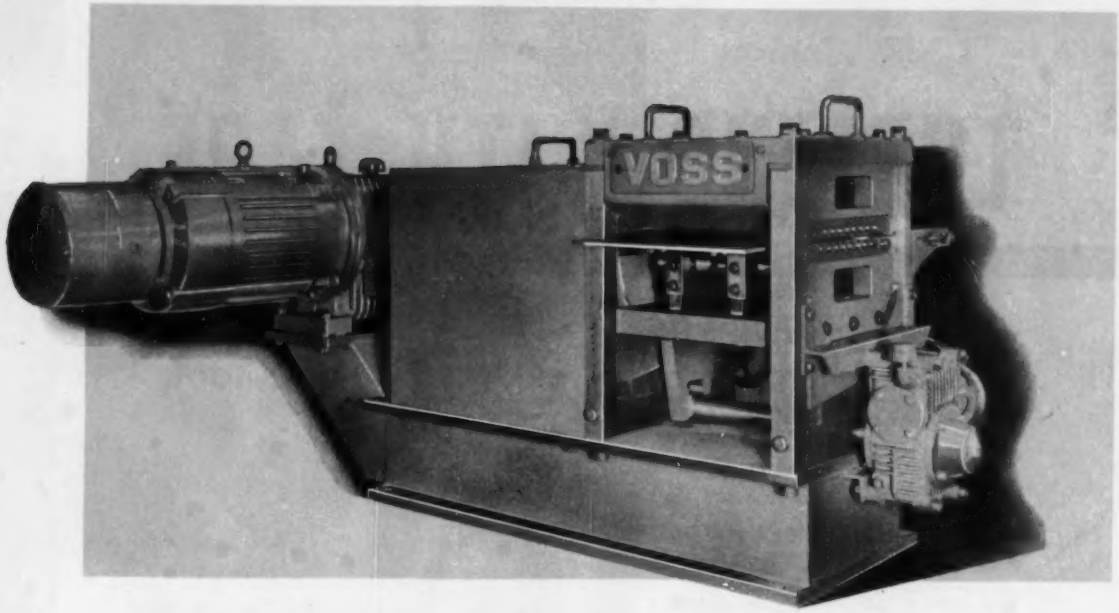
Recommended for drilling accurate holes up to ⅝ in. in diameter by 7 in. deep, the hydraulic feed unit offers the advantages of highly uniform feed rate with simple feed rate changing. Pump and spindle are independently powered with a 1½-hp totally enclosed spindle motor driving through a timing belt drive. For general use, variable speed drives are available for speeds up to 10,000 rpm. For holes having depth greater than 7 in., the No. 24C can be furnished with 12, 24, or 36-in. stroke. Driven by a 1½-hp Dynabrake motor through a non-slip timing belt, the spindle can be run at speeds from 720 to 12,000 rpm with a 3600-rpm motor or at 360 to 6000 rpm with an 1800-rpm motor. Feed can be changed through pick-off gears from a minimum of 0.00019 ipr to a max of 0.0015 in.

Leland-Gifford Co, Worcester 1, Mass

MORE DATA? Circle 110, inside back cover

INCH-PER-SECOND HARDENING of 5-in. surface of torsion bars is possible with new fixturing developed for Ther-Monic equipment. Machine accepts lengths from 80 to 100 in. and does the hardening job within the torsion bar's original tolerance—*Induction Heating Corp, Brooklyn, NY*

MORE DATA? Circle 111, inside back cover



HERE'S THE MACHINE THAT'S REVOLUTIONIZING STAMPED PARTS-FLATTENING*

DEAD FLAT—FAST! That's what the Voss stamped parts-flattener does. As fast as it's fed, it achieves within .005 of dead flatness—*in one pass*. Eliminates hand flattening on an enormous variety of stamped parts. Can even be engineered to flatten parts having irregular surfaces.

COMPACT: Most models are compact enough to sit on a desk top. Yet the flattener inherits the ruggedness of the famed Voss Precision Roller Leveler.

* One major user reports that 2 Voss parts-flatteners and a few operators have replaced 300 workers engaged in hand flattening operations.

We'll be glad to arrange a demonstration with your parts, without obligation.

Voss ENGINEERING CO.

7301 Penn Ave. Pittsburgh 8, Pa. Churchill 2-4422

(Makers of the Voss Precision Roller Leveler)

TOOLING WITH TAPE

...the way to get dollars out of nonproductive metal and into money-making machine tools

You are looking at a $12,000 scrap heap of jigs which have been replaced by punched paper tape costing only $500 to program and produce.

The costly jigs were used simply to position cutting tools on hole work. Now, with a tape-controlled Giddings & Lewis horizontal boring, drilling, and milling machine, tools are automatically positioned with extreme accuracies.

But the tape not only replaces the jigs, *it does far more.* Inaccuracies requiring corrections on the assembly floor are a thing of the past. Certain checking operations and large gages are eliminated. Sequence of operations, feeds and speeds for drilling and boring, and feed rates and end points for milling work all are programmed for optimum production.

The tape-controlled machine does more work in a day — in less space — at lower cost than the machine-plus-jigs which it replaced.

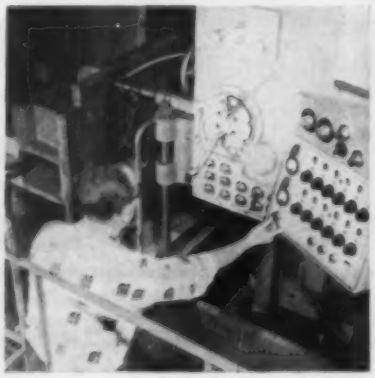
The arithmetic works out well. Users of G&L tape-controlled machine tools are regaining their total investment in as little as one to four years through time and tooling savings alone.

Tape control has "arrived" — to give you a cost and competitive advantage. For complete details and literature, call your Giddings & Lewis distributor or write to Giddings & Lewis Machine Tool Company, Fond du Lac, Wisconsin.

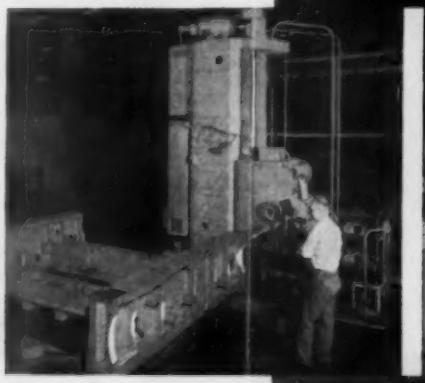
GIDDINGS & LEWIS

"$36,000 TOOLING SAVINGS on four parts for a new machine" — Brown & Sharpe Mfg. Co., Providence, R.I.

"ELIMINATED FIXTURES that took as long to make as the part itself" —The Budd Company, Philadelphia, Pa.



"SAVED $130,000 on tooling for one new product" — The Goss Company, Chicago, Ill.



CIRCLE 280 READER SERVICE CARD

"$12,111.48 IN JIGS TRADED FOR $513.20 WORTH OF TAPE" — The Goss Company, Chicago, Ill.

EXPERIENCE

to help you into tape

from the people who developed the first commercially available numerically controlled machine tool

There is a profitable place for numerical control nearly everywhere that short-run machining is done. But the final decision to go into tape is dependent upon a number of economic and manufacturing considerations. You can come with confidence to Giddings & Lewis to discuss these considerations.

G&L pioneered tape-controlled machine tools . . . has produced more major machines with numerical control than any other builder . . . has developed its own control systems . . . uses tape-controlled machines extensively in its own shops . . . and has established a numerical control research, development, testing, and programming center unique in the industry.

Every one of the following types of machines was *first* made available with tape control by Giddings & Lewis: contour milling machine, vertical boring mill, vertical turret lathe, die sinking machine, and horizontal boring, drilling, and milling machine.

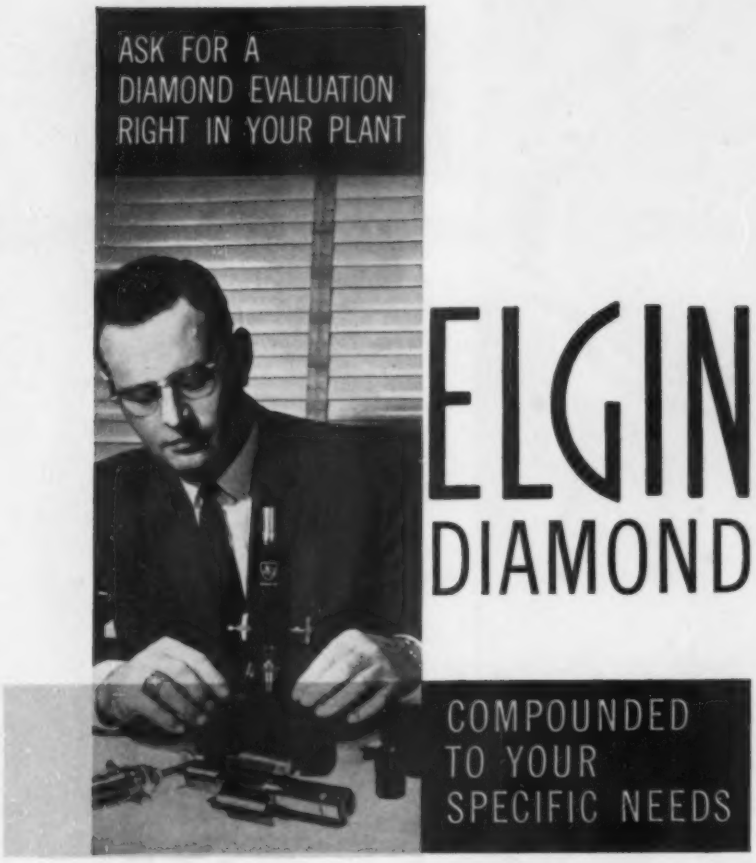
For experienced answers to your tape control questions, consult your Giddings & Lewis distributor or the factory.

GIDDINGS & LEWIS MACHINE TOOL COMPANY, Fond du Lac, Wisconsin

Combination jig-borer and milling machine; horizontal boring, drilling, and milling machines; vertical turret lathes; vertical boring mills; positioning tables; die sinking machines; contour milling machines; radial and upright drilling machines; planers; planer mills; numerical and tracer control systems; Davis boring tools.

GIDDINGS & LEWIS

T-102 CIRCLE 281 READER SERVICE CARD

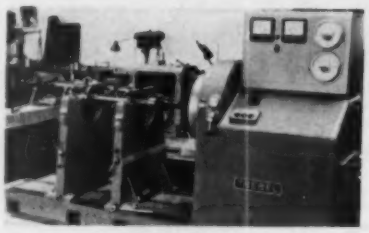


If you're not getting a *true* micro-inch surface or extremely close tolerances when finishing hard-to-work materials, call your Elgin field engineer. He is a diamond specialist and whatever the material . . . hardened steels, carbides or ceramics . . . he will solve the problem of precision polishing and finishing by recommending an Elgin Diamond compound for your specific application. The Elgin Diamond compound he selects will be of the right grading and concentration for the best performance on your job. Your Elgin field engineer carries a microscope and will conduct an exacting visual inspection under actual production conditions at your plant. Write for the complete Elgin Diamond Compound catalog. For special assistance on your polishing or finishing problems call your local Elgin Diamond specialist or write:

Abrasives Division
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

CANADIAN DISTRIBUTOR B.S.A. TOOLS LTD. 228 Norseman Street, Toronto 18, Ontario

NEW SHOP EQUIPMENT



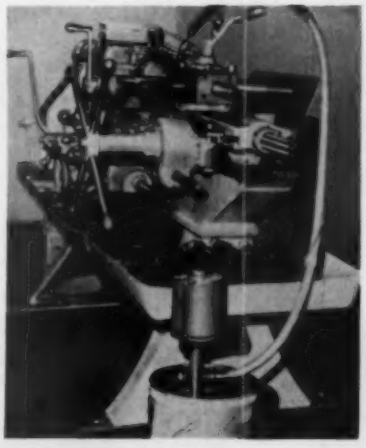
Automatic Balancer Gives Readings Without Trial Runs

Trebel Model F force measuring balancing machine automatically indicates the amount of unbalance in a workpiece, and the exact angular location, without the need of trial ca'ibration runs or test weights.

Actual operating conditions of the rotating element are simulated by supporting the work on rigid bearings. The centrifugal forces which the rotating workpiece exerts due to unbalance are measured directly by a pressure-sensitive transducer. Thus the need for first converting unbalance force into vibration, then measuring it, has been eliminated. The unit is equally suitable for piece work as well as for production runs and can be operated by relatively unskilled personnel. The operator can shift from one type of workpiece to another without need of calibration charts or a setup man.

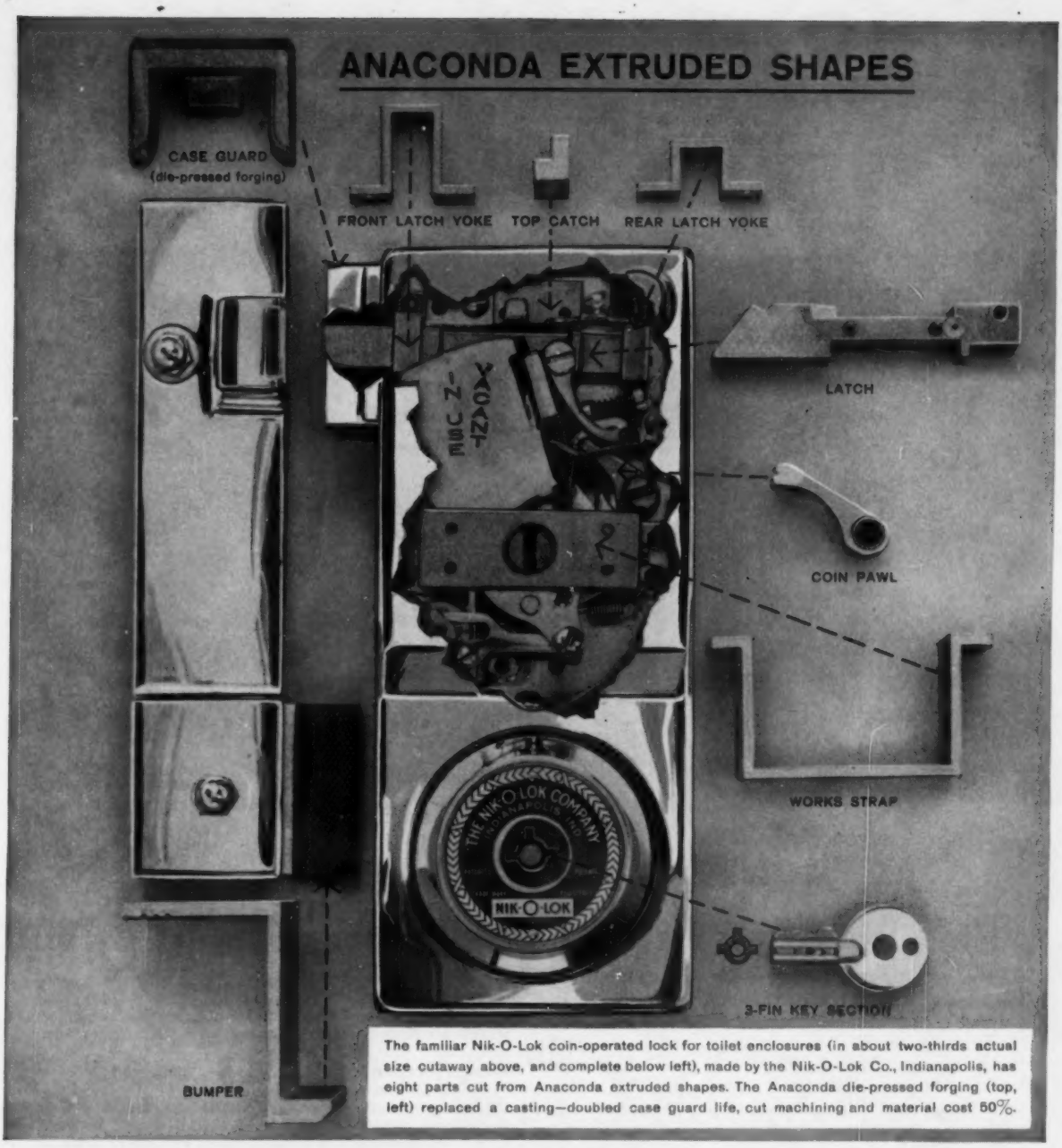
Dist by Kurt Orban Co, American Trebel Div, 87 Greenwich Ave, Greenwich, Conn

MORE DATA? Circle 112, inside back cover



PORTABLE COOLANT PUMP called Mr Cool can be used on one or two machines at a time. The 22½-lb, 2-ft-tall unit can be set into any convenient container for operation. It has a GE ¼-hp motor—*M-M-A Inc, Lancaster, Pa*

MORE DATA? Circle 113, inside back cover



The familiar Nik-O-Lok coin-operated lock for toilet enclosures (in about two-thirds actual size cutaway above, and complete below left), made by the Nik-O-Lok Co., Indianapolis, has eight parts cut from Anaconda extruded shapes. The Anaconda die-pressed forging (top, left) replaced a casting—doubled case guard life, cut machining and material cost 50%.

How parts sliced from long lengths of "premachined" brass shapes cut costs. It starts in design. You select cross sections which minimize subsequent machining—and scrap. The only limitation is that grooves, slots, etc., must parallel the axis of the extruded bar. The smooth surface of extruded shapes reduces many finishing operations. And high dimensional accuracy simplifies assembly. In addition, you get superior, long-wearing parts that improve the quality of your product, because of the strong, homogeneous wrought-metal structure of extruded shapes. For imaginative and practical help in adapting extruded shapes to the economical production of intricate parts, see your Anaconda representative. Or write: Anaconda American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

6143 ANACONDA®

How Allison Wheels help you get

Quick, Accurate Cuts on Any Material, Any Shape

• Abrasive cutting can give you *cleaner* cuts, *faster*—on almost any material from titanium to fire brick. But only when you use the proper cut-off wheel can you get the best results. That's where your ALLISON-CAMPBELL Field Engineer can help. Show him your cut-off problem, and he can select the ALLISON wheel that will cut your metals and other hard materials at speeds of just a few seconds per square inch—fine finish, without burn and with little or no burr—accuracy within close tolerances.

No matter what cut-off problem you have, chances are the right ALLISON wheel will do the job more quickly, less expensively, and more accurately than any other cut-off method. There's a complete selection of ALLISON wheels for every abrasive cutting application.

• • •

Resinoid bonded wheels are designed specifically for dry abrasive cutting machines. They cut at rates of 3 to 5 seconds per square inch, will cut 2" x 2" hardened steel on a standard chop stroke machine in 16 seconds.

Rubber bonded wheels are used primarily for wet cutting operations to obtain the finest quality cuts on all types of steel, alloys, titanium, glass, and plastics. Rubber bonded wheels are sometimes used for cutting tubing dry with minimum burr.

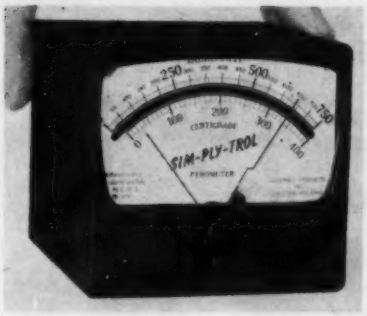
Masonry cutting blades, including reinforced types, are available for both wet and dry cutting of such materials as fire brick, concrete block, glazed tile, and transite. Use of the proper ALLISON wheel can reduce down-time for furnace repairs by speeding the installation of refractory brick.

Fiberglass reinforced wheels provide high cutting speeds while giving extra strength for many foundry cutting jobs. They're available in both resinoid and rubber bonded types, help prevent accidents and costly breakage.

GET THE COMPLETE STORY! Write for **Bulletin DH-214** for detailed information on abrasive cutting techniques, and the wide selection of ALLISON wheel specifications. ALLISON wheels are available 3" to 34" diameter, .006" to 3/16" thick. And remember—your ALLISON-CAMPBELL Field Engineer can give you specialized help. His know-how is your assurance of the efficient, accurate, and economical cutting you can expect from modern abrasive cutting techniques.

ACCO **ALLISON** ABRASIVE CUTTING **WHEELS**

Allison-Campbell Division • American Chain & Cable Company, Inc.
923 Connecticut Avenue, Bridgeport 2, Conn.



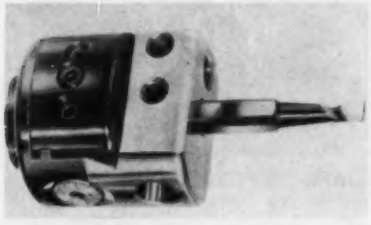
Automatic Temperature Control Offered in Reduced Size

Temp-Tendor controls, designated Model 450, are small automatic controls only 1/5 the size of former units, yet capable of maintaining heat within ± 1 F. They are designed for panel mounting with visual signal indications and are reported to be particularly suitable for built-in OEM applications; they take up only as much panel space as the meter itself requires.

These controls, which measure 4¼ in. wide, 4 in. high, and 5½ in. deep, utilize a form of proportioning action that minimizes overshoot of the set point and produces an almost flat temperature curve. They are available in eight standard temperature ranges between 300 and 2500 F. Cost of the standard control with a single high set-point is $185.

Assembly Products Inc, Chesterfield, Ohio

MORE DATA? Circle 114, inside back cover



Lido Boring Head Incorporates Three Boring Bar Holes

Designed to simplify and speed setups, these boring heads have two vertical boring bar holes plus a cross hole for exacting, rigid tool positioning and holding. Tools are simply locked into position by easily accessible lockscrews. Completely enclosed dial screw provides accurate adjustments which are directly read from a micrometer dial. Shanks are interchangeable.

Lido Tools, PO Box 403, Costa Mesa, Calif

457

MORE DATA? Circle 115, inside back cover

flux stays put...
air stays out!

smoother welds every time when back-up tool is glass cloth

TAPES FROM 3M

As a back-up material in submerged arc welding operations, "Scotch" Brand Glass Cloth Tape holds flux in . . . keeps unwanted air out. Tape adheres instantly to underside of girth or longitudinal seams for butt, double V and fillet type welds. Its use overcomes need for expensive jigging or other cumbersome back-up methods used to prevent burnout.

TRY THIS METHOD. See how it minimizes your flux waste and clean-up costs. Ask your 3M Representative or nearest "Scotch" Brand Tape Distributor for a demonstration, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn. Dept. IBA-41.

SCOTCH BRAND
tapes for industry

Minnesota Mining and Manufacturing Company
...WHERE RESEARCH IS THE KEY TO TOMORROW

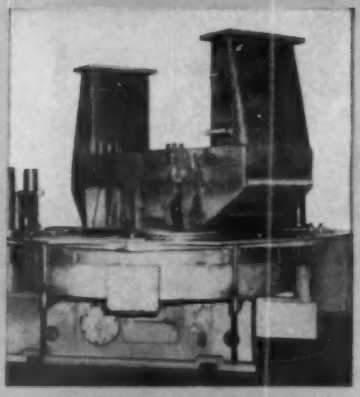
"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.

A LAPMASTER CAN MEAN BIG SAVINGS...A BETTER PRODUCT

here are more examples of how:

HIGH PRODUCTION RUNS or small lots—both turned out with *consistent* accuracy on a Lapmaster. Day-in-day-out production rates range from a few pieces to thousands per day.

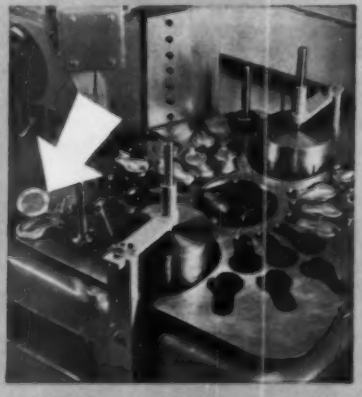
FLATNESS OF .0000116" or less with a micro-inch finish of 2 to 3 RMS is everyday work for a Lapmaster. Uniform accuracy maintained piece-after-piece because conditioning rings automatically keep lap plate flat.



4920 LB. PARTS can be handled—as well as small ⅛" dia. pieces. This 84" dia. weldment for a radar tracking antenna was lapped to a flatness and parallelity within ± .00005" on a Lapmaster Model 84.

TALL and SMALL PARTS AT THE SAME TIME. No expensive fixturing required...in most Lapmaster applications only inexpensive masonite or micarta work holders are necessary. Eliminates danger of stresses and warpage usually caused by clamping during grinding.

EXTERNAL and INTERNAL LAPPING IN ONE OPERATION. Versatility of the Lapmaster is demonstrated in this lapping operation on R. R. air brake parts. Reciprocating mechanism runs small lapping block in and out of work while other parts are being lapped on plate.



SHAPE OR FORM NO PROBLEM. Special lap plate and work holder permit lapping of swing check valve. Other simple attachments and holding devices can be furnished to facilitate lapping of "hard-to-handle" or extremely large parts.

Lapmaster®

...THE MACHINE THAT PUT PRECISION LAPPING ON A PRODUCTION BASIS

WRITE FOR THE COMPLETE LAPMASTER STORY

Write for bulletins describing the Lapmaster line and chart on measuring flatness.

A product of

Crane Packing Company

6436 OAKTON STREET • MORTON GROVE, ILLINOIS (Chicago Suburb)

In Canada: Crane Packing Company, Ltd., Hamilton, Ont.

NEW SHOP EQUIPMENT

Three new engine-driven welders include a 225 amp ac-dc model which can handle stick electrode welding, Heliwelding, and Aircomatic welding. Two diesel models include the Yellow Jacket rated for 300 and 400 amp jobs and another rated at 250 amp. These models are recommended wherever rough usage is encountered—*Air Reduction Sales Co, 150 E 42nd St, New York 17, NY*

MORE DATA? Circle 116, inside back cover

200 Series regulators reportedly give the performance of a two-stage regulator with the economy of a single valve. Output pressures are not affected by varying inlet pressure, and flow capacity is not restricted by extra valving. Flutter or vibration is said to be non-existent even when full cylinder pressure is suddenly applied with the pressure adjustment turned in to maximum.

Kim Products Inc, PO Box 1288, Lexington, Ky

MORE DATA? Circle 117, inside back cover

Bina-View alpha-numeric readout accepts any BCD code up to six bits, does its own translating, and displays the proper character. Featuring electro-magnetic operation, it will display up to 20 characters a sec; character size is 1⅜-in. high—*Industrial Electronic Engineers, Inc, 5528 Vineland Ave, North Hollywood, Calif*

MORE DATA? Circle 118, inside back cover

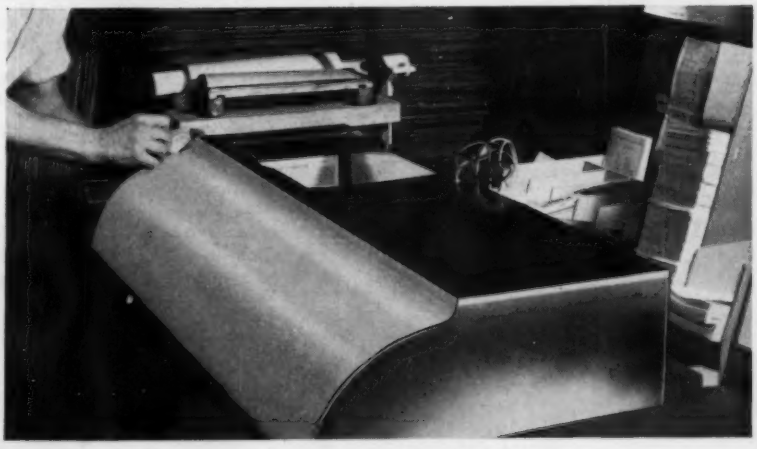
Machine which strips braided wire shielding from coaxial cable and shielded wire is available in two models: Model 15 cuts shielding lengths from ½ to 1½ in., and Model 35 cuts lengths from ½ to 3¼ in. Both machines are compact, having been designed to be bench mounted. On the average, one machine has equalled the work of twelve persons, saving 184 man hours per machine a day, according to manufacturer—*Cadre Industries Corp, Box 150 Endi-Cott, N Y*

MORE DATA? Circle 119, inside back cover

Line of worm gear speed reducers is said to offer hp capacities up to 80% higher than those of conventional reducers of same size. Line comes in nine sizes from 3-in. and 12-in. center distances; ratios extend from 4 1/7:1 to 95:1; ratings are from fractional to 175 hp—*Cleveland Worm & Gear Div, Eaton Mfg Co, 3300 E 80th St, Cleveland 4, Ohio*

MORE DATA? Circle 120, inside back cover

from die to delivery with no repolishing!



metal formed without a scratch when covered with protective

TAPES FROM 3M

Now you can stamp, blank or fabricate highly polished metals by first covering the area to be worked with "Scotch" Brand Protective Tape. Even light draws may be made without die-marking the finished surface. Nor is repolishing necessary. On most products, the tape can even stay-put up to point of use.

TRY THIS METHOD. See for yourself how "Scotch" Brand Protective Tapes save both time and rejects in your plant. Ask your nearest "Scotch" Brand Tape Distributor to show you how, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn. Dept. IBA-41

SCOTCH BRAND
tapes for industry

Minnesota Mining and Manufacturing Company
...where research is the key to tomorrow

"Scotch" is a registered trademark of 3M Co., St. Paul 6, Minn.

why Ampex uses NIKON OPTICAL COMPARATORS

The new Ampex AR-300, developed principally for military and scientific applications, is the only recorder capable of covering a 4-megacycle bandwidth. It can capture and record phenomena beyond the range of any equipment in use today.

The most vital component in the AR-300 is its rotating recording head, designed to achieve the high, head-to-tape velocity required for wide band response, yet maintaining a relatively low, reel-to-reel speed.

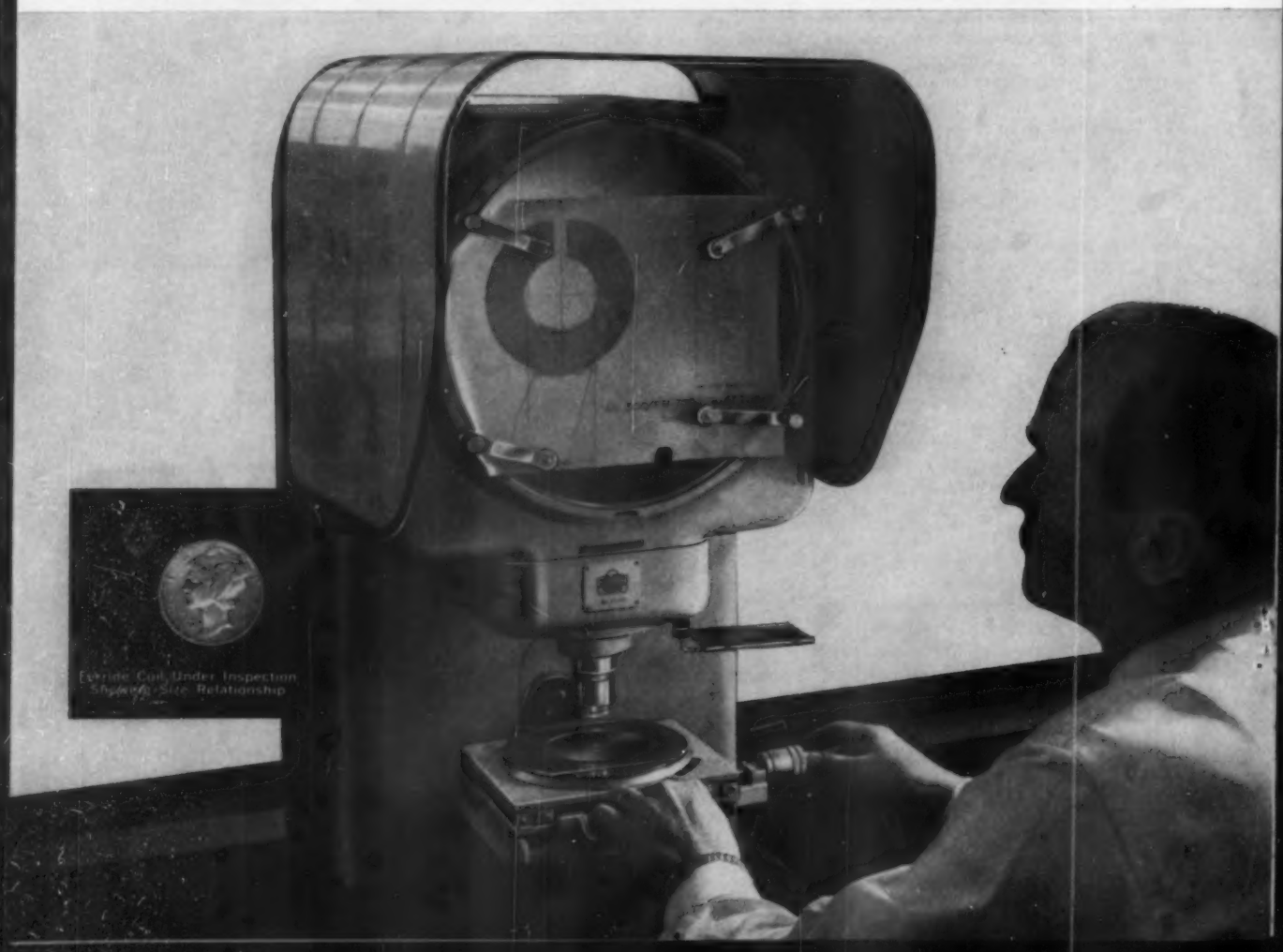
Nothing in the manufacture of the AR-300 proved as critical as the production of this head. Most of its parts did not lend themselves to conventional inspection methods. While .0001" tolerances had to be maintained, Ampex standards call for inspection equipment capable of at least 10 times the required accuracy.

This inspection problem was finally solved when the task was assigned to a Nikon 6 Optical Comparator. Not only did the Nikon Comparator provide the exact measurements required during 'in-process' inspection, but it also permitted consistent duplication of these measurements, time after time.

Today, the Nikon 6 has a permanent position on the AR-300 production team. Furthermore, there are now five additional Nikon comparators serving Ampex in other production projects, and in development—helping to maintain the high quality standards for which Ampex products are justly famous.

Why not investigate what a Nikon comparator can do for you? Write for complete, illustrated catalog to Dept. AM-4

NIKON INCORPORATED, 111 FIFTH AVE., NEW YORK 3, N. Y.



NEW SHOP EQUIPMENT

New Airflox S-20 Compact Senior Vise has two cross-base keyways so that there is a choice of position across a machine table. It is equipped with chip plate and felts installation, and movable jaw pressure grease system where each time grease is applied, the movable jaw is lubricated above and below the vise bed, and at same time any chips, dirt, or coolant are pushed out from under jaw—*Production Devices Inc, White Hall, NY*

MORE DATA? Circle 121, inside back cover

Sonoflux magnetic powders kit has powders in three standard colors (red, black, grey) and in three bright colors (bright red, yellow, blue-black). A metal test piece containing flaws, included in kit, is permanently magnetized for convenience in evaluating samples. Sample kit free—*Dept MS, Sperry Products Co, Div of Howe Sound Co, Shelter Rock Rd, Danbury, Conn*

MORE DATA? Circle 122, inside back cover

18-in. self-centering power chuck, available either as a one-piece steel casting or special aluminum alloy forging, comes with 2 or 3 jaws. Special cam and lever design is said to hold work more rigidly while machining with heavy feeds. Max jaw travel is ½ in.—*The S-P Mfg Corp, 30201 Aurora Rd, Cleveland 39, Ohio*

MORE DATA? Circle 123, inside back cover

Line of 1000 and 2000 psi double pump power units for general industrial service have the DCP power unit offered in standard 30 and 60 gal reservoir sizes, with combined pump capacities to 33 gpm. All units have an 1800 rpm motor—*Hannifin Co, Dept 518, 501 S Wolf Rd, Des Plaines, Ill* •

MORE DATA? Circle 124, inside back cover

AM/MM

"I brought you something to while away the long hours, Jenson."

final touch-up
fast and clean!

fine-line separations between colors made sharp with masking

TAPES FROM 3M

The final touch of quality for Evinrude outboard motors goes on easily and quickly with the help of masking tapes from 3M. After motor shrouds are covered with flexible shields and sprayed, separation between colors is ragged. Application of "Scotch" Brand Masking Tape and a quick final touch-up spray makes the separation sharp and clean.

TRY THIS METHOD. See how it speeds finishing operations and improves results. Ask your 3M Representative or nearest "Scotch" Brand Tape Distributor for a demonstration, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IBA-41.

SCOTCH BRAND
tapes for industry

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

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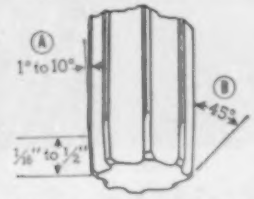
CLIP AND FILE

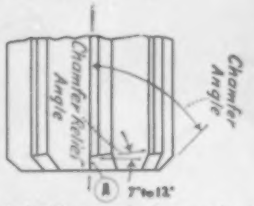
REAMING TIPS YOU CAN USE

SECONDARY CHAMFER



Grinding a secondary chamfer angle as illustrated (A) is often recommended. It is useful in applications where a fine finish or close tolerance is required. (B) is the regular chamfer.

KEEP IT SHARP



A chucking reamer is an end cutting tool. The cutting edges are produced by the chamfers at the ends of the lands. (A) To obtain maximum performance, the chamfers and clearance relief should be reground before excessive wear develops. Each chamfer should be ground exactly even or the tool may cut oversize.

OVERCOMING CHATTER

To end chatter in reaming, try Chicago-Latrobe's Duo-Spiral Reamer. The alternate left and right hand helixes tend to dampen cutting vibration; eliminate hogging; produce more accurate, better finished holes.

GOT A PROBLEM?

Arrange a consultation with a Chicago-Latrobe Sales or Service Engineer. His experience in hundreds of plants can lead to a quick solution of your problem.

Best tip of all...

ASK YOUR DISTRIBUTOR FOR...

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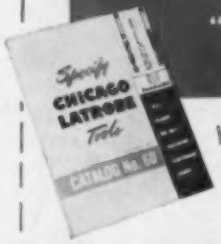
CARBIDE TOOLS • SPECIAL TOOLS and
"LO-TORK" CHIP BREAKER DRILLS



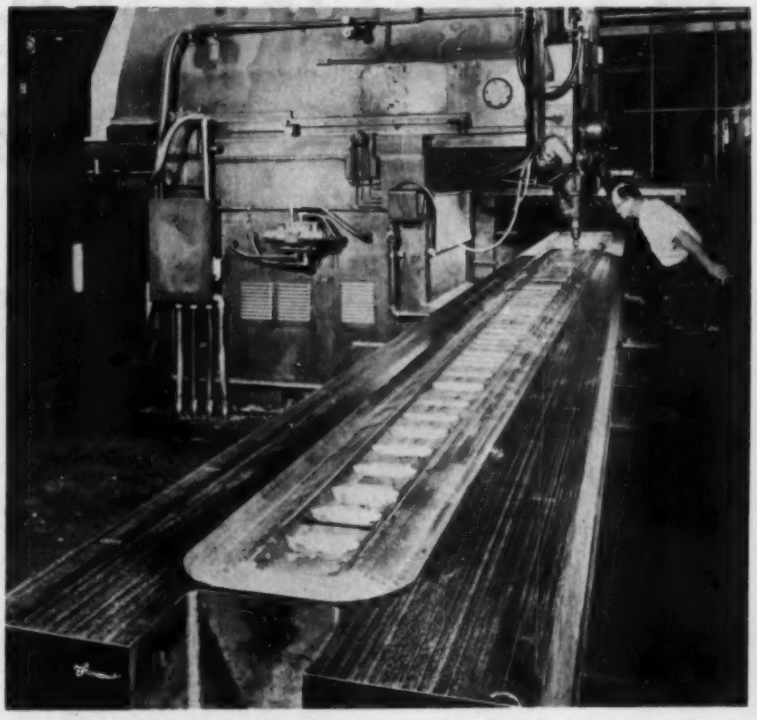
Write Chicago-Latrobe or call your distributor for CATALOG No. 60. Sixty-eight pages of illustrated listings and specifications—including prices.

CHICAGO-LATROBE
416 West Ontario Street Chicago 10, Illinois

Ling-Temco, Chance Vought Agree on Merger

Approval "in principle" has been reached by the boards of Chance Vought Corp and Ling-Temco Electronics Inc, on a plan to merge the two organizations. Stockholders will vote on the merger at a meeting to be held during the latter part of June. It is reported that Ling-Temco would be the surviving company, in effect, even though there would be a new name for the consolidated company.

Operating segments of both firms would remain intact and both would have equal representation on the board. Robert McCulloch, now chairman of Ling, would become chairman and chief executive officer. G K Johnson, Chance Vought president, would become president. James J King, now president of L-T, would be chairman of the executive committee. F O Detweiler, Vought chairman, would not remain with the new company, according to the announcement.



14-ton die is being machined at Alcoa's Cleveland works. Fillets are put on the ribs of the die which is 14 in. thick, 26 in. wide, and 272 in. long. It is for installation in a 50,000-ton press to shape what is believed to be the longest closed die forging ever produced. The part is a wing spar for the T-39 Sabreliner, a twin jet utility plane developed by North American Aviation

Black & Decker Buys Into French Tool Firm

Black & Decker Manufacturing Co, Towson, Md, producer of portable electric tools, has acquired a majority interest in Societe de Construction Mechaniques du Dauphine of France.

The French company had been a subsidiary of Landis-Gendron, S A, which in turn was owned by the Landis Tool Co of Waynesboro, Pa. It will manufacture Black & Decker tools under French tradenames of Micox and Micox-Isal.

Lionel Corp . . .

. . . has held merger discussions with American Bosch Arma Corp as well as with a number of other companies, according to Maj Gen John B Medaris (USA Ret), president of Lionel. He reports that talks with American Bosch were preliminary and that no arrangements have been made for further discussions at this time. It had been stated that merger talks were being held on a continuing basis.

Press Automation Expands

Press Automation Systems Inc, Detroit manufacturer of automation equipment for metalworking pressrooms and stamping plants, has expanded its operations and purchased a 25,000-ft plant facility on East Outer Drive. Manufacturing operations are underway at this third plant expansion since the company was formed in 1955. One reason for the expansion is the growing overseas market for such equipment, according to the firm. PAS has a European sales organization with headquarters in England and Belgium.

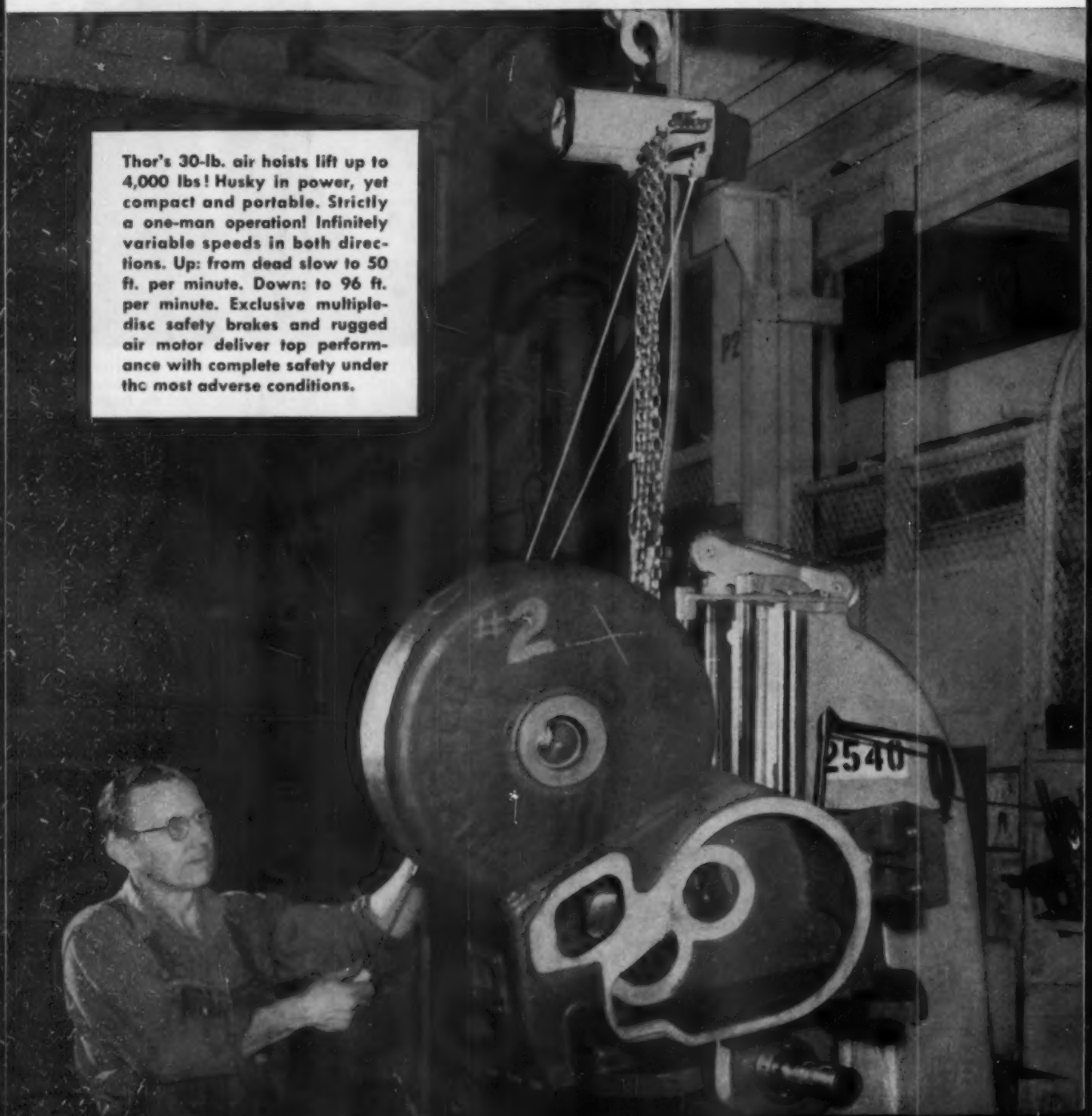
Bendix Gets B-58 Order

Flight control systems and air data computers for the Convair-built B-58 Hustler will continue in production at Teterboro, NJ, under new contract awards totalling $27 million. Contracts were awarded by Convair Division, Fort Worth.

TODAY'S ONLY JULY 3RD, BUT I THINK IT'S VERY GENEROUS AND CONSIDERATE THAT YOU'VE GIVEN THE PLANT THIS EXTRA DAY OFF.
IN FACT, WITH THE 4TH FALLING ON A TUESDAY, I THINK ALL WORKING PEOPLE, THE NATION OVER, SHOULD HAVE TODAY OFF. DON'T YOU THINK SO, DEAR?
I CERTAINLY DO!
I'M SO GLAD YOU AGREE!
THE KITCHEN IS THATAWAY
COFFEE
BREAD
SUGAR
GRESHAM
7-3
MOE'S CORNER
Them look like curlers in Mrs. McGirk's hair. But they're really firecrackers...
...she's wearin' BANGS for the 4th!
4?!

Lift up to 4000 pounds with new 30 lb. air hoists

THOR INDUSTRIAL AIR TOOLS



Thor's 30-lb. air hoists lift up to 4,000 lbs! Husky in power, yet compact and portable. Strictly a one-man operation! Infinitely variable speeds in both directions. Up: from dead slow to 50 ft. per minute. Down: to 96 ft. per minute. Exclusive multiple-disc safety brakes and rugged air motor deliver top performance with complete safety under the most adverse conditions.

There are as many ways to save your money on these two pages as there are Thor models of the tools shown. Every hoist, hammer, chipper, nut runner and grinder has been designed with only one purpose—reduce your costs by increasing production. That's been Thor's business now for 68 years. Make it your business to find out how Thor can help you. A nationwide network of factory experts and distributors are at your service. The Yellow Pages list them. Or write us at Thor Power Tool Co., Aurora, Ill.

THOR AIR IMPACT WRENCHES save time and money on nut running, screwdriving, reaming, tapping, applying and removing studs. Capacities from ¼" to 1¼".

THOR MULTIPLE AIR NUTSETTERS assure greater accuracy of torque control; definite savings over individual tool applications involving close patterns.

IT'S THOR POWER that does it! Thor air chipping hammers are famous for it. That, plus stay-on-the-job durability, economy and ease of operation. Complete selection of plate and spool valve chipping hammers; scaling hammers; riveting hammers.

LARGE CAPACITY HOISTS TO 3 TONS. Up to 90% faster. No jerking or vibrating. New, more powerful motors with mufflers. Thor has the hoist to complete it—any job faster and safer!

GET 50% MORE grinding power, 6 times quieter. Thor air grinders, available in forty models. Cup grinders, wire brushing machines and disc sanders.

THOR POWER TOOL COMPANY
AURORA, ILLINOIS

Thor POWER TOOLS

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Cut machinery installation time and costs up to 70, 75, even 80% . . . eliminate transmitted vibration up to 85%! That's the money-saving move with Level-Rite Series "500" — latest member of the Unisorb family. No lagging, no cement, no drilling, no "hit or miss" spotting is needed. Unisorb Level-Rite mounting is fast — machines can be moved and relocated quickly and with a minimum of downtime.

Level-Rite Series "500" is a self-contained leveling mount for light and medium duty machine shop tools. It withstands weights up to 750 lbs. Send for literature.

SPECIAL ADVANTAGES: Fast, simplified, precise leveling • Free-floating screw post — compensates for uneven floor • Safe, sure grip — can be cemented if needed • Lowers noise level — increases worker efficiency • Better machine performance (improved alignment) • Available in many types and thicknesses for all machine types • Money-back trial is yours for the asking.

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City.....Zone.....State.....

FIELD REPORT

General Cable Corp's . . .

. . . Tampa, Fla, plant will fill a $4.8 million order for telephone cable to be shipped to Israel. Contract was negotiated jointly by General Cable and Automatic Electric International Inc, a subsidiary of General Telephone & Electronics Corp. Order will require an additional work force of 120 persons at the plant for a year to manufacture enough wire to encircle the earth 10 times.

Hewlett-Packard Talks Merger

Officers of Hewlett-Packard Co, Palo Alto, Calif, and Sanborn Co, Waltham, Mass, have begun discussions to determine whether agreement can be reached on terms of a possible merger. H-P, electronics manufacturer, reported sales of slightly over $60 million last year; Sanborn, producer of medical instruments had sales amounting to $15 million. If initial agreement is reached it'll have to be OK'd by directors and stockholders of both firms.

FMC Corp Gets $40 Million Order

Food Machinery & Chemical Corp has a $40.6 million contract from San Francisco Army Ordnance District for 1500 aluminum armored personnel carriers. Some $20.9 million of this will go to subcontractors for supplies, services, and components, and this order is expected to prevent San Jose from falling into a Class D surplus labor area. Of the subcontracts, $11.5 million will go to distress labor areas.

AM/MM

"We've replaced the brass check system with a co-signer system."

BETTER STEELS FOR BETTER PRODUCTS

NEW
FREE MACHINING
UNILOY 303MA*
STAINLESS STEEL

•MACHINES UP TO 50% FASTER
•LENGTHENS TOOL LIFE

Uniloy 303MA is a free machining grade of chromium-nickel stainless steel developed by Universal-Cyclops. It has been proven greatly superior to AISI Type 303 in key plants throughout the country.

Production tests have proved that Uniloy 303MA machines up to 50% faster than Type 303. Cutting tools last longer, decreasing tool cost and machine down time. Completed parts have a better finish than is possible with Type 303, and the corrosion resistance is far superior.

*Patent No. 2,900,250

Send for a copy of our new brochure containing complete data on Uniloy 303MA, and for Performance Reports citing dollar savings achieved by satisfied customers.

Contact your nearest Universal-Cyclops steel service center or sales office. Uniloy 303MA is AVAILABLE FOR IMMEDIATE DELIVERY.

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STAINLESS STEELS • TOOL STEELS • HIGH TEMPERATURE METALS

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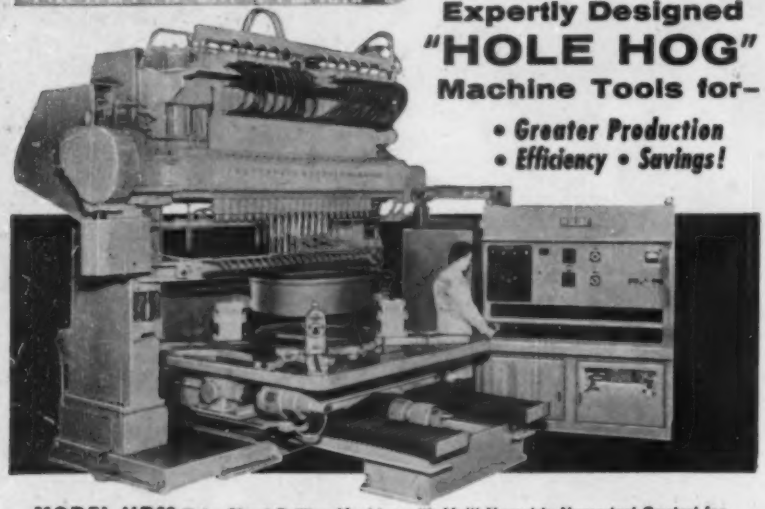
MOLINE

MULTI-NUMETRIC NUMERICAL CONTROL

(AS APPLIED TO MULTIPLE SPINDLE DRILLING)

Expertly Designed "HOLE HOG" Machine Tools for–

• *Greater Production*
• *Efficiency* • *Savings!*



MODEL HD68 Tube Sheet Drilling Machine with Multi-Numetric Numerical Control for positioning of machine table in two directions and for selection of spindles. Information on punched tape permits automatic drilling of a complete hole pattern in a tube sheet without interruption.

60 years of Machine Tool Engineering Experience is at your service for—

115

• Multi-Spindle Boring • Single and Multi-Spindle Honing
• Straight Line Multi-Drilling • Adjustable Spindle Drilling
• Special Multiple Operation Machine Tools

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CIRCLE 296 READER SERVICE CARD

automatic spray by DeVilbiss applies measured amounts of lubricants and coolants exactly where needed during metal-forming and machining operations with split-second timing. Fully adjustable for spraying duration, spray pattern size and shape. Get complete facts from: The DeVilbiss Company, Toledo 1, Ohio. Offices in principal cities.

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FIELD REPORT

Fansteel Acquires Wesson Cimplex

Fansteel Metallurgical Corp, North Chicago, Ill, producer of refractory metals, has acquired the Wesson Tool Co, Detroit. No stock is involved; the purchase price ($6.3 million) will be paid by Fansteel in cash and promissory notes.

The Wesson complex includes Wesson Multicut Corp; Wesson Metal Corp, including Archer & Smith Division; and Wesson Co as subsidiaries. In addition, Fansteel is acquiring the controlling stock interest in the Canadian subsidiary, Wesson Cutting Tools Ltd. Wesson plants are located at Lexington, Ky, and Brighton and Ferndale, Mich. Facilities will be maintained in their present locations.

Lathrobe Steel Co . . .

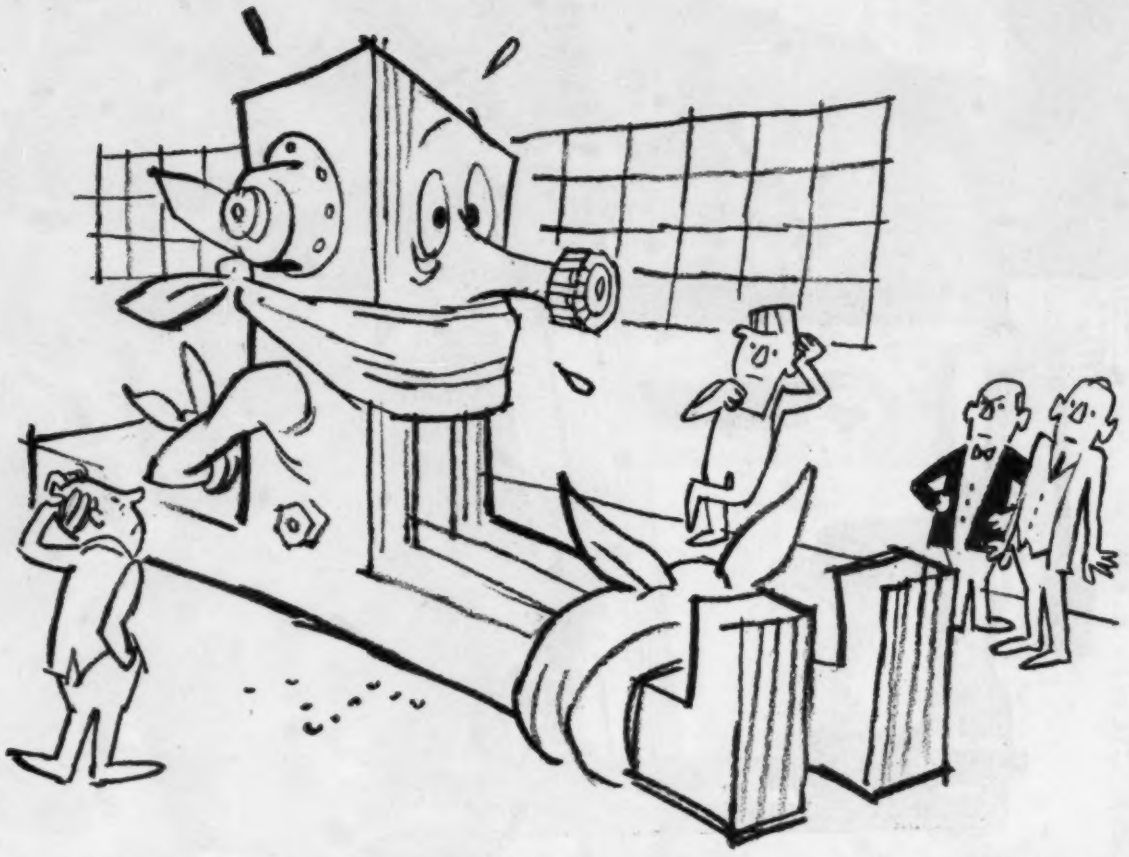
. . . Latrobe, Pa, has purchased a majority interest in Cast Masters Inc, Racine, Wis, development foundry specialiing in the production of large precision castings for the pattern making and tooling fields. The move, according to company spokesman, will enable Latrobe to supply helpful technical data to the increasing number of independent firms making smaller cast tool components.

Autolite Buys Smelting Operation

All physical assets of the Consolidated Smelting & Refining Co, Detroit, have been purchased by Electric Autolite Co of Toledo. The 5-year-old facility, which employs approximately 40, will continue to operate primarily as a lead smelter.

AM/MM

"Aw, it's a cookie. My wife's trying to be funny."



HOW TO TIE-UP A MACHINE INVESTMENT

without getting caught. It's easy, especially if it's not intentional, to make a capital investment almost helpless. Lots of people are doing it today simply by using milling cutters or blades which don't give the machine a chance to come up to its capability.

Sometimes this process is carried on under the name of "cost reduction." Blades are used which have a small per-unit price tag. But, the fallacy here is that the annual expenditure may mount up to a large percentage of the total cost of the machine without getting the performance required for profitable operation.

There's a safe way to let your machines perform up to their capabilities and still reduce costs to a minimum . . . let us work with you in making an unbiased study of the tooling requirements.

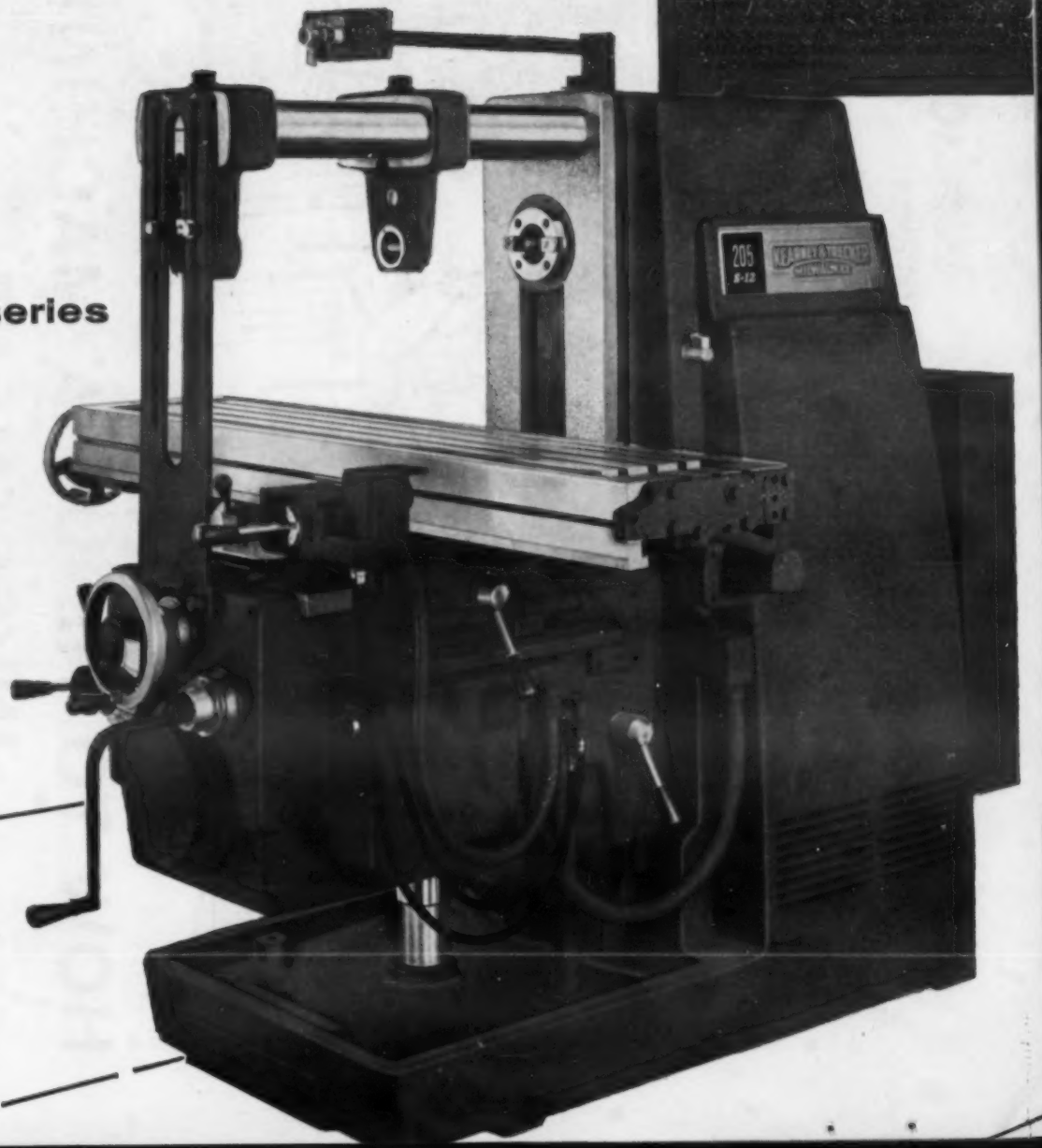
It will be unbiased because Ingersoll has no favorite type or method. Our aim is to help get the right type of tool on the job. *In doing so, we will apply the engineering knowledge and wide experience which has helped hundreds of users make the most profitable choice . . . the tool which will help the machine, not hinder it, the tool maintenance procedure (if any) which will best meet your individual requirements . . . the most economical tool which can do the job you want done.*

Cutter Division's modern production facilities are unsurpassed

If you're interested in helping your milling machines perform up to their most efficient capacities, ask to have an Ingersoll sales-engineer tell you about the Ingersoll Cutter Service and the Blade Back-Up Program. Write: **The Ingersoll Milling Machine Company, Cutter Division, 505 Fulton Avenue, Rockford, Illinois.**

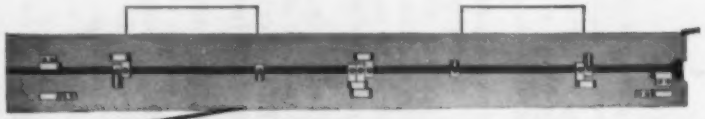
MORE PARTS FASTER with the NEW S-12 series

knee type milling machines



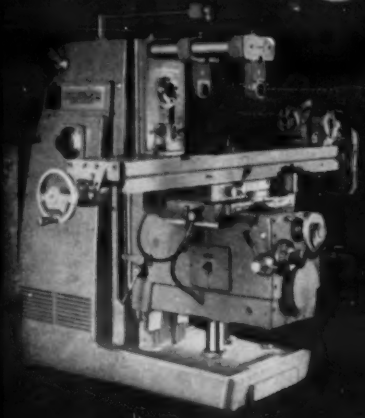
Unquestionably your first impression of the clean, functional styling of these all-new "*S-12's*" will be an immediate feeling of modern precision, strength, stability, and careful, thorough engineering. BUT — there's a lot more to these all-new "*S-12's*" than first meets the eye! There are time-saving, production-boosting features incorporated in this all-new "*S-12 Series*" that make it worthy of your most serious *Consideration and Comparison* if you have any thought of modernizing your plant facilities to increase productivity.

Here are but a few of the new "S-12 Series" features that can help you make more parts — faster.

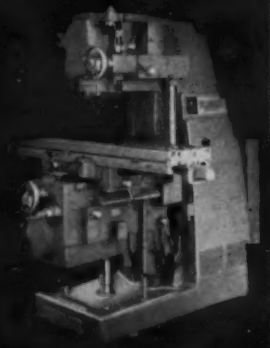


SIMPLIFIED TRIP DOGS . . .

COMPARE K&T's exclusive AUTOCYCLE Control for production milling with knee type flexibility and versatility . . . more parts faster with less effort, because idle time is automatically converted to cutting time. Four types of trip dogs — Feed, Rapid, Reverse, and Stop — mounted in a single slot on the front of the table, control a basic reciprocal automatic cycle. Automatic cycles can be to left and/or right for either conventional or climb milling . . . permit utilization of full table travel.



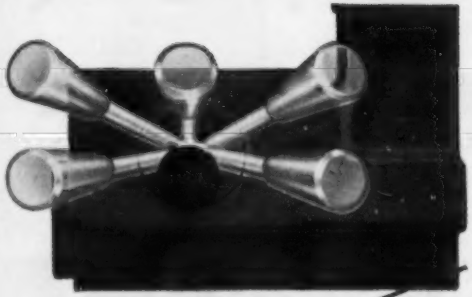
New 307 S-12
(7½hp No. 3)



New 307 S-12
(7½hp No. 3)

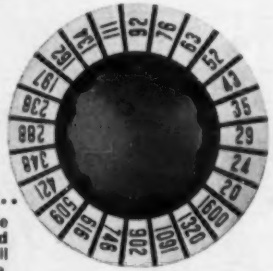
New 307 S-12
(7½hp No. 3)

Available on
TOOL LEASE
Minimum Capital Investment
Your Choice of 3 Plans



SINGLE LEVER CONTROL...
COMPARE this new concept in single-lever control, the **MONO-LEVER**, a Kearney & Trecker "First" in the industry. On all **AUTO-CYCLE "S-12's,"** this single, six-position lever controls table feed, rapid traverse, AND rapid traverse movements of saddle, knee, and vertical head . . . is used for both manual or **AUTOCYCLE** control with equal advantage.

POWER ASSIST FEED CHANGE...
COMPARE the speed and ease of the **S-12 Feed Rate Change** . . . a simple pull and turn with these large, easy-to-read Feed Range Dials through the shortest arc in either direction, and the **S-12** is set to the desired feed rate. Changes are locked in without over-ride or coasting — change gears are hydraulically shifted and held.



POWER ASSIST SPEED CHANGE...
COMPARE the ease of the **S-12 Speed Change.** Just a pull and turn of this large, easy-to-read dial through the shortest arc in either direction to select any of 24 speeds from 20 to 1600 RPM on the **205 S-12's.** 24 speeds, from 30 to 2400 RPM on the **307 S-12's.** Speed changes are locked in without over-ride or coasting. Shifting is smooth and quiet. Safety interlock prevents change being made during a cut.

AUTOMATIC BACKLASH ELIMINATOR...
COMPARE the **S-12's Self-adjusting Automatic Backlash Eliminator.** Makes climb milling just as easy as conventional milling. A mere twist of the wrist sets it for instant use in reciprocal milling cycles.

QUICK-SET DIALS...
COMPARE this **S-12** time-saver, **Rapid-Set Micrometer Dials.** Non-glare finish for easy reading . . . spring-loaded. Merely pull out and rotate to desired setting, and release for quick, positive-lock settings . . . graduated in .001" increments. Handwheels and handcranks do **NOT** spin during power feeds or rapid traverse.

This is but a brief look, a mere smattering of the outstanding features incorporated in these all-new *S-12 Series* machines. They're literally new from top to bottom, inside and out, for truly modern cost-saving, maintenance-saving, fast, accurate, profit-producing operation.

All we ask is that you Consider and Compare these all-new Kearney & Trecker S-12 Series Milling Machines. Discover for yourself that there are none newer . . . none finer . . . none better suited for increasing productivity.

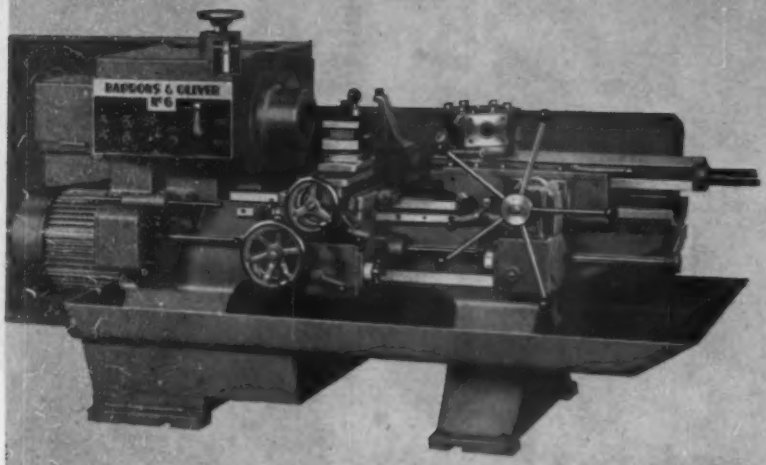
To assist you, the facts for your *Consideration and Comparison* — Bulletin No. S-60, and RS-60 will be mailed promptly upon request.

Standard Machinery Division

KEARNEY & TRECKER MILWAUKEE

KEARNEY & TRECKER CORP.
6800 W. NATIONAL AVE., MILWAUKEE 14, WIS.
(or phone GReenfield 6-8300... direct Distance Dialing Code No. 414)

CIRCLE 300 READER SERVICE CARD



RAM TYPE TURRET LATHES		
Size	Bar Capacity	Swing Over Bed
No. 2 Geared Electric	1″ or 1¼″	13½″
No. 3 Universal	1½″ or 2″	15½″
No. 4 Universal	2″ or 2½″	18¼″
No. 6 Universal	3″ or 5″	21¼″
SADDLE TYPE TURRET LATHE		
No. 21 Universal	3″ or 4½″	21¼″

BARDONS & OLIVER

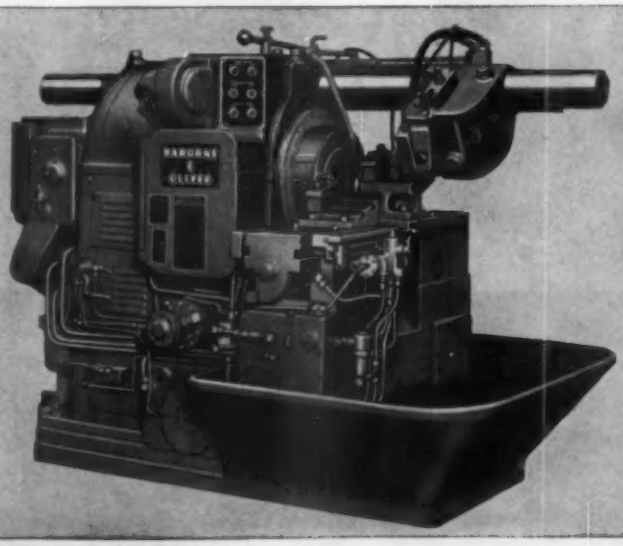
Turret Lathes . . . .

Each of the five Turret Lathes listed is a completely different machine, designed specifically for one range of work. All units on each machine, including the cross slide and carriage, and the turret slide and saddle, are "sized" for a particular work range. Thus adequate strength and rigidity is provided, maximum productive capacity is offered, and at the same time minimum operator effort is required. A complete line of tooling and attachments is available for each size of machine.

Cutting-Off Lathes

The Cutting-Off Lathes are designed to chamfer, form and cut off pipe, tubing, or bar stock with maximum efficiency. The number of pieces produced per hour often equals or exceeds that of much more expensive and complicated multiple spindle machines. Automatic loading tables, chamfer attachments, forming attachments, and automatic unloading devices are available for all sizes of Cutting-Off Lathes. These lathes are built as fully automatic, semi-automatic or hand operated.

CUTTING-OFF LATHES	
Size	Capacity
No. 32	2″
No. 33 and 34	3″ and 4″
No. 35 and 36	5½″ and 6⅝″
No. 38 and 39	8⅝″ and 9⅝″
No. 312 and 314	12¾″ and 14½″
No. 316	16″



BARDONS & OLIVER

BARDONS & OLIVER, INC., 1133 WEST 9th ST., CLEVELAND 13, OHIO

Manufacturers of Turret Lathes and Cutting-Off Lathes

MBP Forms New Division

Miniature Precision Bearings, Keene, NH, has set up a new division to produce and market a line of lowcost miniature ball bearings. New unit will be called Mina Bearings, a division of MPB Inc.

The product line is similar to the high precision bearings made by MPB which are used in miniaturized equipment primarily for the missile and aircraft industry. Basic difference in the two types is the requirement for dimensional tolerances. In the new bearing, tolerances are given in 10 thousandths of an inch rather than millionths of an inch. Specially designed for commercial products, they'll sell at about one-half to two-thirds the cost of the standard ultra-high precision items.

Chance Vought Buys Two

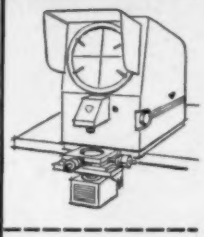
In an extension of its diversified program, Chance Vought Corp, Dallas, is acquiring (through exchange of stock) two Los Angeles firms, Harbor Boat Building Co and Harco Engineering Co. Vought says the acquistion provides complementary facilities and know-how to extend the company's expanding activity in anti-sub warfare, marine engineering, oceanography, ships' instrumentation, and other marine equipment.

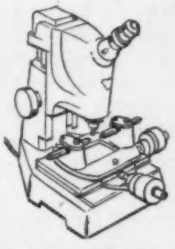
In addition to shipbuilding, Harbor Boat developed and is manufacturing lightweight fiberglass and steel shipping containers for several major aircraft companies. Harco, an offshoot of the 40-year-old shipbuilding firm, works in the fields of marine, electrical, and electronic engineering.

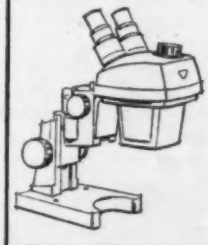
AM/MM

"Fired! What are you trying to do, kill my incentive?"

Let's talk about YOUR precision measurement problem!







Do you need fast, accurate measurements to a "tenth" or better? Some contour, an angle? Or odd-shaped small parts that have to meet tight tolerances in *all* dimensions?

Maybe all you need is a reticle in an eyepiece of our popular new StereoZoom® Microscope. Or the critical accuracy of our Toolmakers' Measuring Microscope. Or perhaps our Bench Comparator, for the dual capability of measurement *and* silhouette comparison. Or—but why just guess about it?

We have a complete line of optical measuring instruments ready to help you. More than that, we'll be glad to suggest the equipment that will do the job best, at lowest cost. No obligation, of course. Just drop the coupon in the mail today and let our experts brainstorm your problem.

BAUSCH & LOMB

Made in America, to the world's highest standard.

BAUSCH & LOMB INCORPORATED
61816 Bausch St., Rochester 2, N.Y.
My measuring problem is .....
.....
.....
Please advise, with no obligation on my part.
NAME, TITLE .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

Friden Filling Post Office Order

Assembly of 250 money order punches is being carried out by Friden Inc, San Leandro, Calif. The pilot lot has been ordered by the US Post Office as a fore-runner of 60,000 units. PO authorities will field test the machines for design and manufacturing soundness after which the order will be placed for the rest of the units to be delivered within one year.

Western Electric Co . . .

. . . has a $23.2 million Army contract for Nike Hercules missiles.

Flo-Tronics Buys Plastics Firm

Kenco Plastics, Walker, Minn, has been taken over by Flo-Tronics Inc, Minneapolis. The company will be integrated with Wilcox Products Co, a subsidiary which manufactures custom molded plastic parts. The merger adds painting, finishing, and increased assembly facilities to Wilcox.

$4 Million Order to Lear

Contracts totaling $4 million for jet engine air-inlet and trailing-edge flap systems for F-105 fighter bombers, scheduled for construction through 1962, have been awarded to the Electro-Mechanical Division of Lear Inc, Grand Rapids, Mich. Total orders which have gone to Lear for the two systems now amount to more than $15 million.

Leasing Firm Opens on West Coast

James Talcott Western Inc, subsidiary of James Talcott Inc, New York, has opened a San Francisco office to provide industrial time sales financing and equipment leasing services to clients in the Bay Area and Pacific Northwest. The firm has been formed on the West Coast to finance installment sales and leases of income- producing machinery and equipment to manufacturers, dealers, and distributors. This includes all types of heavy production machinery, machine tools, air conditioning, fixtures, and hauling equipment.

Curtiss-Wright's Buffalo Div Gets Work for Missiles and Subs

The Metals Processing Division has received new contracts of a substantial amount for production of extruded products used in the Titan and Atlas ICBM, and the Navy's nuclear submarine program. Work on the new orders calls for extrusion of more than a million pounds of T sections for fabrication into structural ribs for the submarines.

Company's annual report states that a special process has been acquired recently that will give the Metals Processing Division "the only facility in the US for the extrusion of stainless steel tubing of the high-pressure, high-temperature resistant type required for nuclear power installations." This tubing can be extruded in diameters up to 20 in.

Israel's First Pop Car

Production will start in June of Israel's first popular car, a French-designed, French-tested 9-hp, 4-cylinder, four-door, six-seat sedan. Initial production rate will be 3000 per year. The Kaiser-Ilin Industries of Haifa (which assembles Jeeps and Larks, plus trucks, and makes many of the components in Tel-Aviv) demonstrated the prototype. It's 5 ft 2 in. wide, 12 ft 3 in. long, 4 ft 5 in. high. Three models will be produced—a car, station wagon, and a commercial van.

Hathaway Buys LA Firm

Western Hydraulic & Service Co, Los Angeles manufacturer of hydraulic and pneumatic equipment, has been acquired by Hathaway Instruments of Denver. Purchase includes the company's patented Tog-Loc internal mechanical locking cylinder. Hathaway produces electro-mechanical and electronic systems and components for industrial, commerical, and military use. Western Hydraulic will become a division of Clemco Aero Products, a Hathaway subsidiary in Los Angeles.

AM/MM

"We'll sell you twenty semiautomatic piston grinders for, let's see, six dollars and twenty three cents!"

ASARCON

DISTRIBUTORS for ASARCON CONTINUOUS-CAST BRONZE:

ALABAMA
Birmingham
Dixie Bronze Co., Inc.
FA-4-4588
J. M. Tull Metal & Supply Co., Inc.
FAIRFAX 3-1612
ARKANSAS
Little Rock
Arkansas Foundry Company
FRANKLIN 2-6261
CALIFORNIA
Los Angeles
Kingwell Bros., Ltd.
LUDLOW 2-7427
San Francisco
Kingwell Bros., Ltd.
SUTTER 1-0514
CONNECTICUT
Guilford
Knapp Foundry Co., Inc.
GLENDALE 3-2744
Seymour
The Derby Castings Co.
TUXEDO 8-2581
Stratford
The Ellsworth Industrial Supply Co.
EDISON 7-3317
FLORIDA
Jacksonville
J. M. Tull Metal & Supply Co., Inc.
EVERGREEN 7-5561
Miami
J. M. Tull Metal & Supply Co., Inc.
OX 6-0150
Tampa
J. M. Tull Metal & Supply Co., Inc.
TAMPA 3-6741
GEORGIA
Atlanta
J. M. Tull Metal & Supply Co., Inc.
JACKSON 5-3871
ILLINOIS
Chicago
Bearing Headquarters Co.
Div., Ray M. Ring Co., Inc.
ESTEBROOK 9-0300
Bronze Bearings, Inc.
JUNIPER 3-1100
Peoria
Ray M. Ring Bearing Co.
PEORIA 6-73-8171
Rockford
Rockford Tool & Transmission Co.
ROCKFORD 2-7711
Waukegan
Bearing Headquarters Co.
Div., Ray M. Ring Co., Inc.
MA 3-5212
INDIANA
East Chicago
Bearing Headquarters Co.
Div., Ray M. Ring Co., Inc.
E. CHICAGO EX 7-8020
SAGINAW 1-8680
Indianapolis
Jones & Laughlin Warehouse Div.
Jones & Laughlin Steel Corp.
MELROSE 1-8311
South Bend
Powell Tool Supply, Inc.
ATLANTIC 9-5578
KENTUCKY
Louisville
Williams & Co., Inc.
JUNIPER 3-7781
LOUISIANA
New Orleans
Standard Brass & Mfg. Co.
AUDUBON 1381
Shreveport
Standard Brass & Mfg. Co.
UN 5-4241
MARYLAND
Baltimore
Bronze Specialties, Inc.
LEXINGTON 9-1905
MASSACHUSETTS
Boston
Kelco Metal Products Co.
HUBBARD 2-1737
Millard Brass & Copper Co.
HIGHLANDS 2-6220
MICHIGAN
Detroit
Copper & Brass Sales, Inc.
FOREST 6-6200
Meier Brass & Aluminum Co.
JORDAN 6-3907
Grand Rapids
Copper & Brass Sales, Inc.
EMPIRE 1-8661
Kalamazoo
Bard Tool and Equipment Co.
FIRESIDE 3-2691
Lansing
Superior Brass & Aluminum Co.
IV 2-2754
Muskegon
Towne Hardware & Supply Co.
2-2651
MINNESOTA
Minneapolis
R. G. Eide, Inc.
FE 8-4865
MISSOURI
Kansas City
Associated Bearings Co.
HARRISON 1-0437
St. Louis
R. J. Bearing Co.
MISSION 7-3625
NEBRASKA
Grand Island
The Island Supply Co.
DUPONT 2-8567
Omaha
T. S. McShane Co., Inc.
JACKSON 1273
NEW JERSEY
Carlstadt
E. A. Williams & Son
GENEVA 8-0800
MARKET 3-1929
(New York LA 4-9546)
Newark
Federal Bronze Products, Inc.
MARKET 2-6330
Perth Amboy
Gregg's Brass Foundry
HILLCREST 2-2086
NEW YORK
Brooklyn
Hamsley, Inc.
STerling 8-1144
Buffalo
Kenneott Associates, Inc.
RIVERSIDE 1520
Rochester
Ontario Metal Supply, Inc.
HAMILTON 6-1830
Syracuse
Meinon Bronze Foundry, Inc.
GLENVIEW 4-3231
Troy
The Troy Belting & Supply Co., Inc.
AS 2-4920 (in Albany 3-6121)
OHIO
Akron
Akron Welding and Spring Co.
JEFFERSON 5-2187
Cleveland
Copper & Brass Sales, Inc.
VU 3-8300
The Bearing Bronze Co.
MICHIGAN 1-6520
Cincinnati
Reliable Castings Corp.
KIRBY 1-2627
Columbus
Williams & Co., Inc.
AXMINSTER 4-1623
Dayton
The Bristol Brass Corp. of Ohio
BALDWIN 8-8185
Toledo
The Seeger Brass Company
CHERRY 8-5321
Williams & Co., Inc.
GREENWOOD 5-8661
PENNSYLVANIA
Easton
R. T. Schaller Co.
BL 2-2435
Latrobe
Latrobe Foundry Machine & Supply Co.
KEYSTONE 7-3341
Philadelphia
Brass & Copper Sales, Inc.
GLADSTONE 7-2500
Renewal Service, Inc.
BALDWIN 9-6300
Pittsburgh
Pennsylvania Industrial Supplies Co., Inc.
ALLEGHENY 1-5010
Pittsburgh Brass Mfg. Co.
ATLANTIC 1-8761
RHODE ISLAND
Providence
Clifford Metal Sales Co., Inc.
UNION 1-4100
SOUTH CAROLINA
Greenville
J. M. Tull Metal & Supply Co., Inc.
CEDAR 3-8366
TENNESSEE
Memphis
Memphis Bearing & Supply Co.
JACKSON 6-7543
Nashville
Dixie Bearings, Inc.
CHAPEL 2-7351
TEXAS
Beaumont
Standard Brass & Mfg. Co.
TERMINAL 3-2641
Houston
Standard Brass & Mfg. Co.
RI 7-1220
Port Arthur
Standard Brass & Mfg. Co.
YUKON 5-9327
WISCONSIN
Milwaukee
Badger Bearing Co.
BROADWAY 2-0231
CANADA
Lachine, Quebec
Federated Metals Canada, Ltd.
MELROSE 7-3591
Scarborough, Ontario
Federated Metals Canada, Ltd.
PLYMOUTH 7-3246

ASARCON

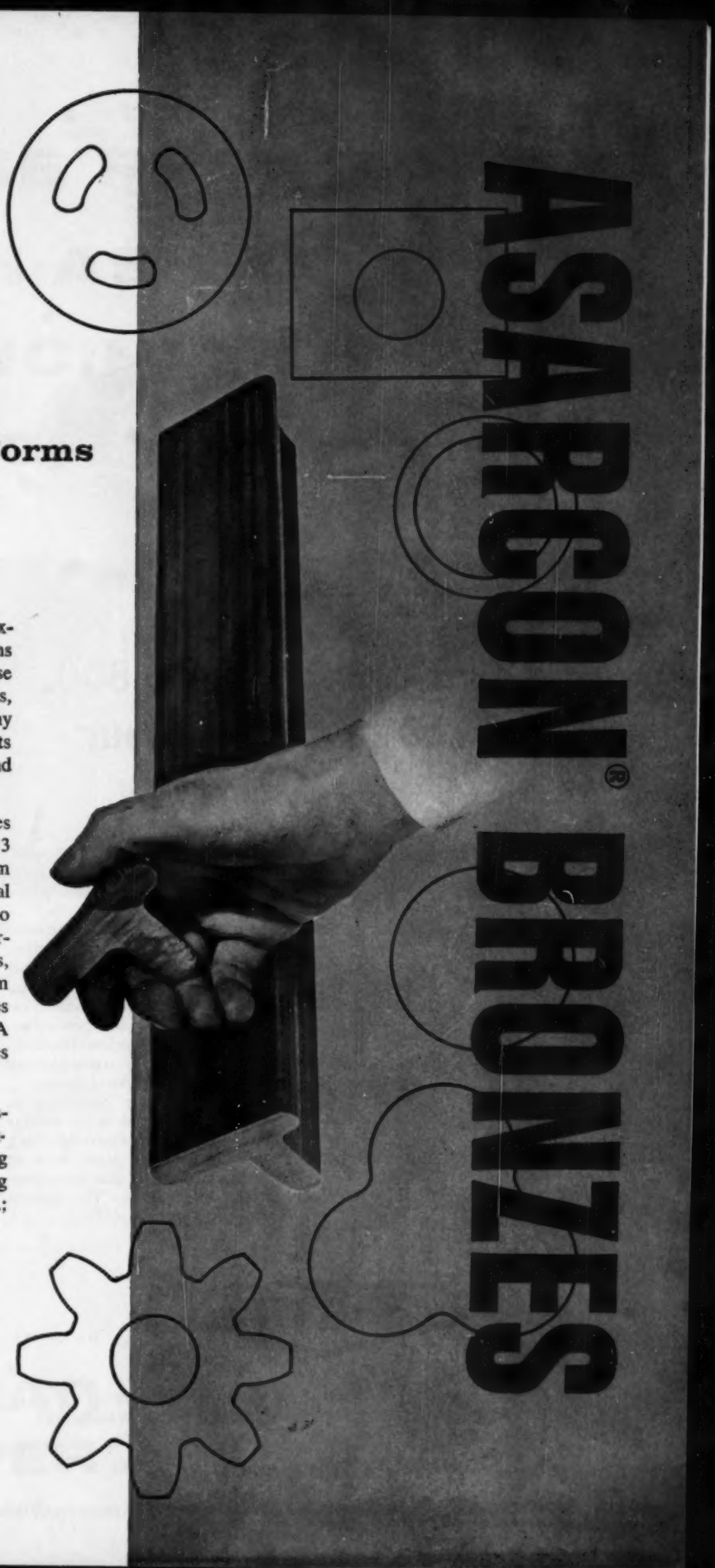
custom shapes and forms in any lengths you need

Asarcon continuous castings give you an extremely wide variety of shapes and forms in standard bronze alloys. They will increase your production rates and lower your costs, because: you get the shape you want in any length you need up to 20 feet. This permits machining on automatic screw machines and other high-speed equipment.

Continuous casting of Asarcon bronzes raises fatigue characteristics of standard alloys 33 to 100%, increases impact strength from 15% to more than double that of identical alloys cast other ways, adds materially to tensile, yield strengths and hardness. Asarcon 773 (SAE 660) bearing bronze in solids, rods and tubes is immediately available from stock in your choice of more than 260 sizes up to 9″ O.D. and lengths up to 105″. A wide variety of other special alloys, shapes and sizes produced to order.

For complete data on Asacon continuous-cast bronze, write Continuous-Cast Department, American Smelting and Refining Company, Perth Amboy, N. J.; Whiting Ind., or 120 Broadway, New York 5, N. Y.; or call your nearby Asarcon distributor.

ASARCO



CIRCLE 304 READER SERVICE CARD

BEFORE BRUSHING
Insulation residue on this small, copper electric motor commutator was a knotty, costly cleaning problem. Rate: 800 per hour.

AFTER BRUSHING
Surface quality-finished . . . insulating material and feather burrs gone . . . ready for trouble-free assembly. Rate: 3500 per hour.

Production soars from 800 to 3500 pieces per hour

...with OSBORN power brushing

PRODUCING at the rate of 3500 pieces per hour (over 330% greater than former off-hand method) these Osborn TY® Master® Wheels remove troublesome phenolic-type residue from electric motor commutators at Dayton Precision Manufacturing Co.

Slow, off-hand methods were being used to remove insulation residue from these commutators. Production was costly . . . parts lacked uniformity.

A specialized, but simple machine now handles the operation. Parts are automatically fed along a guide tube and through a pair of Osborn TY® Master® Wheel brushes. In this centerless type finishing setup—the job is done effectively in pre-set time cycles. Results: production and quality up—rejects eliminated . . . time and costs down.

Cleaning and finishing problems in your plant can be solved with similar production savings. An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost or obligation—is the first step. Write us for full details. *The Osborn Manufacturing Company, Dept. C-110, Cleveland 14, Ohio.*

OSBORN

METAL FINISHING MACHINES . . . AND FINISHING METHODS
POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY

FIELD REPORT

Fluidized-Bed Furnace Contract

Electric Furnace Co, Salem, Ohio, has been granted exclusive manufacturing and sales rights in US and Canada for Boeing's recently developed fluidized-bed furnace.

Thompson Ramo Acquires Interest In German Firm

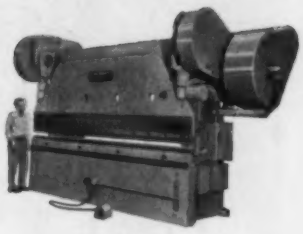
Thompson Ramo Wooldridge Inc of Cleveland and Los Angeles has acquired a 50% capital interest in Teves & Co GmbH of Barsinghausen, West Germany, a subsidiary of Alfred Teves Maschinen und Armaturenfabrik KG of Frankfurt. Joint venture arrangement involved the delivery to Teves of 25,807 shares of TRW common stock and the investment of approximately $3.4 million in cash.

The new company, to be known as Teves-Thompson & Co, Barsinghausen, will manufacture automotive accessories and engine parts for the European Common Market. TRW has 27,000 employees working in research, development, and production of precision parts and systems in the electronics, missiles, space, aircraft, and automotive fields. Sales in 1960 were $420 million. Teves employs about 2500 people and manufactures automotive valves, piston rings, cylinder sleeves, and other automotive parts.

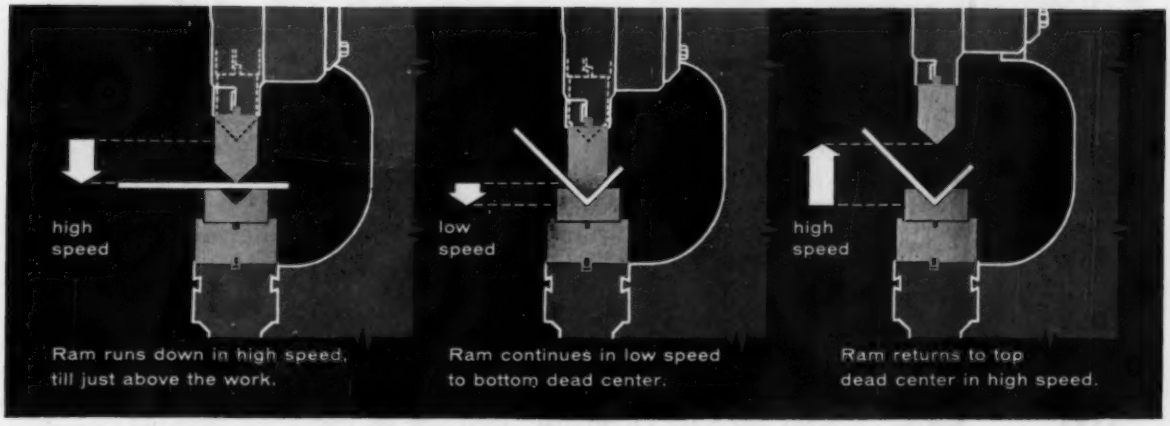
AM/MM

"This is the day of the specialist and my specialty is waiting for the crane."

INCREASE PRODUCTION AS MUCH AS 60% WITH CINCINNATI®



Automatic Cycle Press Brakes


high speed
low speed
high speed
Ram runs down in high speed, till just above the work.
Ram continues in low speed to bottom dead center.
Ram returns to top dead center in high speed.

If you form long, flexible parts, you can increase your production up to 60% with a Cincinnati Automatic Cycle Press Brake.

A new, exclusive feature, the Cincinnati Automatic Cycle provides a combination of instantaneous fast and slow ram speeds with every stroke. As a result, you get maximum production speed without the "whip up" and "back bending" which often occur in high speed forming of long parts which have no beam strength.

You no longer have to rely on the operator's skill at clutch slipping to obtain parts that are free of "back bends."

You can get this money-making feature on all new 7 and 9 Series Cincinnati Press Brakes.

This productive new feature means a lot of advantages for you:

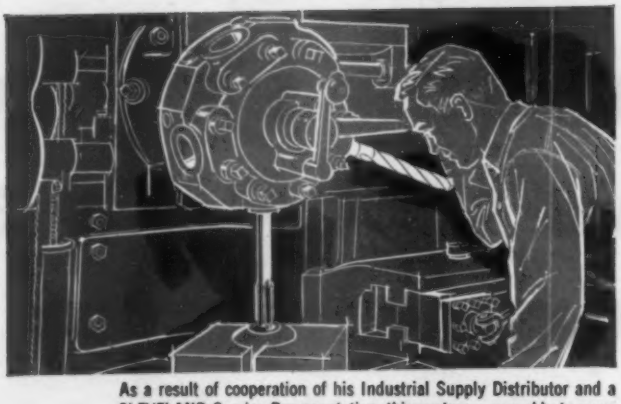
1. Job records show 10% to 60% increase in parts formed per hour.
2. Low speed portion of the ram stroke can be set so that all strokes are identical in length.
3. Rejects caused by "back bends" are stopped.
4. Highly experienced operators are not required.
5. Operator fatigue is greatly reduced because there is no need for clutch slipping.
6. Clutch and brake are long-life, minimum-maintenance units requiring no adjustments.

Write Dept. A for full details about the Cincinnati Automatic Cycle, write for Bulletin B-9R.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.



As a result of cooperation of his Industrial Supply Distributor and a CLEVELAND Service Representative, this customer was able to ream 1,800 holes per grind in a 1040 steel projectile part, without sacrifice of hole size or finish. A typical example of "Teamwork Tooling"!

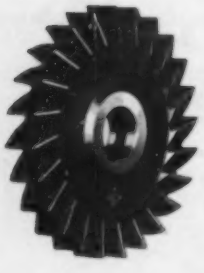
How to get cost reduction through "Teamwork Tooling"

When you tackle the problem of cost reduction, you will find the solution is not *cost per tool*, but rather *cost per hole*.

And, if you apply Value Analysis to the subject of cost per hole, you always arrive at the same answer: Only with *quality* tools can you get faster production, less down-time and fewer rejects.

When you buy CLEVELAND Tools you get the very best manufacturing experience and know-how . . . *plus* the added benefits of "Teamwork Tooling", which means combining the skills of many people to help you reduce costs.

CLEVELAND Quality Tools can be obtained from the stocks of your local Industrial Supply Distributor, who has the assistance of our trained Service Representatives to recommend savings through proper tooling for *your* job conditions.



THE CLEVELAND TWIST DRILL CO.
Cleveland 1, Ohio

QUALITY CUTTING TOOLS • BEST SERVICE THROUGH YOUR LOCAL DISTRIBUTOR

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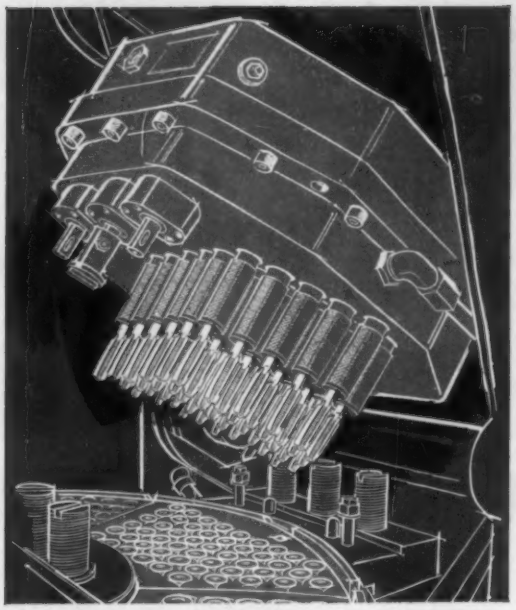
To Help You Cut Your Tapping Costs



BAY STATE Taps have the strength and stamina to reduce costly down-time on this high speed set-up, where 25,000 holes are threaded per hour. The taps have built-in QUALITY . . . your assurance of cost reduction on all jobs, whether large or small.

The most economical tapping operations can be performed only with *highest quality* taps.

You can reduce your costs with BAY STATE *Quality* Taps. These tools are designed, engineered and manufactured for precision performance . . . to give you long, dependable service which is your assurance of maximum production with a minimum of costly down-time.

BAY STATE *Quality* Taps and Dies are carried in stock for prompt delivery by your local Industrial Supply Distributor, who maintains balanced inventories for you at lowest cost. Moreover, the steady flow of orders from hundreds of distributors enables us to produce the tools in large, economical quantities—with resultant advantages to you.

BAY STATE TAP AND DIE CO.
Mansfield, Mass.

Subsidiary of The Cleveland Twist Drill Co.

QUALITY CUTTING TOOLS • BEST SERVICE THROUGH YOUR LOCAL DISTRIBUTOR

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"6 MEN OUT AGAIN TODAY?" "WHY?"

"I was on the receiving end of that question. And I knew what the boss was driving at. Production-wise, we couldn't stand our current rate of absenteeism. Even the men on the job were dragging their feet. To show you what I mean: we had just lost one of our best customers. Reason: one too many late shipments.

"Logically, when sickness strikes, you consult a doctor. Which is what I did. Without actual examinations, he couldn't diagnose the trouble. But he did give me the clue when he asked, 'How are your working conditions?'.

"Frankly, our plant is dirty. Or better put, dusty. With grinding machines running 24 hours a day, how could it be anything else? With that thought, I remembered. A salesman had been in my office just the other day talking about dust. I had too many production headaches at the time to hear him out. But I kept his card. So I called him back.

"He was from Torit. He was selling Torit Dust Collectors . . . machines that trap dust. When I compared the low cost of his equipment with the high cost of our production lag, I decided it was worth a try. So I bought one . . . just one, to start, for $285.00. We installed it ourselves on a key machine.

"The change in the man operating that machine sold me. Within a month, we had a Torit Dust Collector system attached to seventeen dust-producing machines in the plant. As a result, the air in our plant is clean, the way it should be. Our absentee rate is no longer a problem. Our production rate is at top speed. And you know something? I feel better myself!"

Is dust doing you *dirt? For complete facts on dust damage . . . and how to control it . . . write:*

TORIT manufacturing company

Dept. 424, 1133 Rankin St., St. Paul 16, Minn.

NAMES IN THE NEWS

Brown & Sharpe Mfg Co, Providence, RI, has appointed **Frank E Montie** factory manager of the Greystone Plant. Formerly plant superintendent, he will be in charge of manufacturing operations in the Cutting Tool Division

Ford Motor Co has appointed **E C Jeter** general manufacturing manager of the Engine and Foundry Division. Formerly manufacturing manager, foundries, he replaces **Robert Stevenson,** now general manager of the Transmission and Chassis Division

Risdon Manufacturing Co, Naugatuck, Conn, manufacturer of close-tolerance metal and plastic components, has elected **Lewis A Dibble Jr** president to succeed **Lewis A Dibble** who has been named to the new post of board chairman and chief executive officer. The new head of the company was formerly executive vice president.

General Dynamics Corp has appointed **Harris Shapiro** vice president, engineering, of the Electro Dynamic Division, Bayonne, NJ, manufacturer of electric motors and generators. Mr Shapiro was previously assistant division manager, engineering.

"3M" TYPE "C" DISCS CUT GRINDING TIME 1/3!

At a 3M representative's suggestion, Mastercraft Metals, Inc., Bellevue, Ky., a leading manufacturer of stainless steel kitchen equipment recently switched from a competitive brand to 3M Type "C" Discs for grinding welds. The result: a ⅓ reduction in grinding time . . . and Type "C" Discs produce a finer scratch pattern that allows easier, faster blending to the final finish.

COST CHECK 5-4-5

Why not let 3M's new COST CHECK 5-4-5 Program help you to effectively investigate ways to lower costs and increase profits. Discover . . .

- If your grinding can be done more economically
- If your finishing is as efficient as possible
- If your polishing can be done faster and better

Send today for a free COST CHECK 5-4-5 Review Form without obligation. Put 3M's years of abrasive know-how at your disposal. Write: 3M Company, 900 Bush Ave., St. Paul 6, Minn. Dept. No. AAA-41.

3MAGINATION in GRINDING and FINISHING

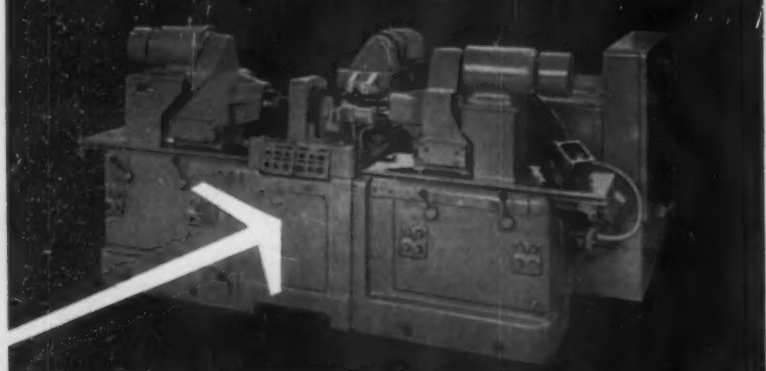
COATED ABRASIVES DIVISION

"3M" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

PRECISION BORING EQUIPMENT... with a new machine guarantee



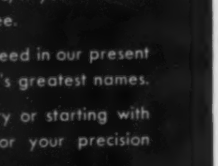
precision boring equipment
by America's greatest names...

Here's a money-saving way to handle every precision boring problem—no matter what. We'll take your present machinery or basic equipment . . . completely retool and rebuild it to your specifications . . . install it in your plant under the supervision of one of our service engineers, if you so desire . . . and back up our work with a NEW machine guarantee.

It's quite possible that we already have the machine you need in our present inventory of rebuilt, retooled machines that bear America's greatest names.

No matter which you choose—whether from our inventory or starting with your machinery, we'll accept complete responsibility for your precision boring problem.

Write for complete money-saving details with an up-to-date list of our current inventories.



DEARBORN
MACHINE TOOL DIVISION

DEARBORN TOOL AND DIE COMPANY
10200 Ford Road, Dearborn, Michigan • LU. 2-3636

NAMES IN THE NEWS

DeWalt Inc, Lancaster, Pa, has elected **Francis H Gerlach** vice president, engineering. Prior to joining the firm he held a similar position at Porter-Cable Machine Co, Syracuse, NY

Nawide Machine Tools Division of Nationwide Engineering Service Inc, Culver City, Calif, has named **James T Ashley** sales manager. The division manufacturers circuit board drilling machines.

Adamas Carbide Corp, Kenilworth, NJ, has appointed **William T Nystrom** field sales manager. He was formerly associated with Brown & Sharpe Mfg Co as director of sales, precision tools and gages.

Allis-Chalmers Manufacturing Co has appointed **Cloice E Temple** works purchasing agent at the Norwood (Ohio) Works. He has been serving in that capacity at the Gadsen (Ala) Works.

Ford Motor Co has appointed **R J Hampson** general manager of Ford Tractor Operations. Succeeding Mr Hampson as general manager of the Transmission and Chassis Division is **Robert Stevenson,** who has been general manufacturing manager of the Engine and Foundry Division. **Richard A Powley** has been named manager of a newly established manufacturing staff at Ford's Aeronutronic Division in Newport Beach, Calif. He has recently held positions with Ford Motor in Michigan as manufacturing operations consultant to the vice president, manufacturing, and as assistant general manager of the Aircraft Engine Division.

Clark Equipment Co has appointed **Marvin Van Dusen** product sales manager of Powrworker electric hand trucks for the Industrial Truck Division at Battle Creek, Mich.

NEW MODEL 1220 DYNAPAK

RUGGED POWERFUL EFFICIENT

DYNAPAK MODEL 1220 . . . massive, rugged all-new model of industry's only proven *high energy rate forming* machine! All-new Dynapak saves expensive metal chips — eliminates costly machining.

SAVES METAL
SAVES MACHINING
SAVES TIME

DYNAPAK MODEL 1220 is designed and built to work a full day *every* day . . . efficiently, dependably, economically! Dynapak uses only one-quarter of its available energy to exceed the force of a 6,000-ton press—always has power in reserve. Models with operating capabilities up to 8 strokes per minute are available.

DYNAPAK MODEL 1220 is versatile—makes a wide variety of products ranging from production tooling to complex turbine blades, missile nose cones and tiny precision surgical pins. Tool steel and the exotic "problem" metals become everyday materials to Dynapak's unique capabilities.

DYNAPAK MODEL 1220 can help *you* do a better job of forging, forming, compacting. Dynapak can help you cut costs and improve profits. Find out now about dependable, performance-proven Dynapak — the new concept in *high energy rate forming*. Write, wire or phone for complete information.

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GD

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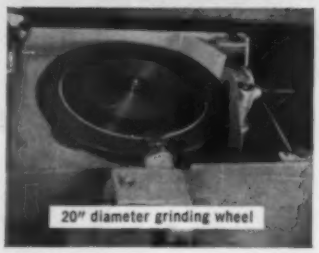
THESE BENEFITS ARE YOURS

when your drills are sharpened on the Model 100-A

WINSLO-MATIC DRILL POINTER

- ... extremely true, close-tolerance holes within .001 of drill size (even in the new super-metals) since drill points are concentric within .0002.
- ... precision conventional chisel type drill points as well as **helical** (self centering) drill points essential to optimum performance on **tape controlled** drilling machines.
- ... increased production from every drill because drills last up to twice as long.
- ... elimination of most reaming requirements.
- ... faster, more precision drilling with fewer rejects.



Get these benefits... and many more with the completely automatic WINSLO-MATIC DRILL POINTER. Handles drills from 1/32" to 1½" diameters.

Write for descriptive literature and check for yourself the many exclusive advantages of the versatile WINSLO-MATIC Drill Pointer.

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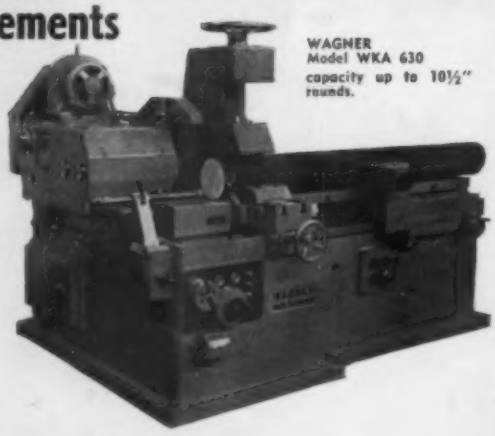
47 ST. JOSEPH STREET • ARCADIA, CALIFORNIA
CIRCLE 313 READER SERVICE CARD

48 MODELS of Cold Saws to meet Your Requirements

WAGNER, with a complete line of semi-automatic, full automatic, high speed and specialized models, covers the entire field for modern cold sawing of machineable metals.
capacities: Standard Models up to 27"
Model WKD 1600 up to 40" Diameter



WAGNER
Model WKA 630
capacity up to 10½" rounds.

Fully automatic hydraulic cold saws give peak production continuously.

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167 Mill Lane — Mountainside, N.J.

ALBERT KLINGELHOFER MACHINE TOOL CORP.

NAMES IN THE NEWS

Elwell-Parker Electric Co, Cleveland, has elected **Sheldon K Towson Jr** president and chief executive officer. Formerly vice president and general manager, he succeeds **W A Meddick,** now board chairman

Hoover Ball & Bearing Co, Ann Arbor, Mich, has named **Robert B Parker** director of materials and **Gerald A Graham** production control manager of the Bearing Division.

Hooker Chemical Corp, New York, has elected **F Leonard Bryant** president. Formerly executive vice president, he replaces **Thomas E Moffitt,** now board chairman and chief executive officer. **Thomas F Willers,** a vice president, succeeds Mr Bryant.

Maremont Automotive Products Inc, Chicago, has appointed **David A Spear** vice president, manufacturing, of the Automotive Replacement Parts Division.

Morse Twist Drill & Machine Co, New Bedford, Mass, has named **Joseph A Guilmette** technical field engineer serving all midwestern states. He will transfer from the New Bedford plant to the Chicago office.

H K Porter Co has appointed **John W Wolcott** general manager of the Disston Division, Pittsburgh. Mr Wolcott comes to the Porter organization from Wetherhead Co where he served as plant manager directing all manufacturing activities at the Cleveland Division.

Dura Corp, Toledo, has appointed **Lee Struble** corporate master mechanic. Formerly manager of the Motor State Products Division, he will be responsible for overall corporate activities in machine tooling and production tooling as well as general manufacturing.

You don't have to baby it—Ledloy® steel actually performs at its highest efficiency when you really push it! ■ Take a tip from the many shops getting amazing results with this go-the-limit steel. Increased machinability, higher speeds and feeds, reduced tool wear with greater production per tool change—all these advantages are yours—if you push Ledloy steels. ■ Inland pioneered in the making of leaded steels—has the solid background that means dependable recommendations for your kind of operation and your specific product. Be sure the leaded steels you use are Inland Ledloy steels—the result of more than 20 years of research, development and continuous production. Ledloy steels are available from your Cold Drawer or your local Steel Service Center. Send for "Properties of Ledloy Steels," an informative booklet Inland will be glad to mail at your request.

LEDLOY® STEELS CAN TAKE IT!

the world's most machinable steels

INLAND STEEL COMPANY

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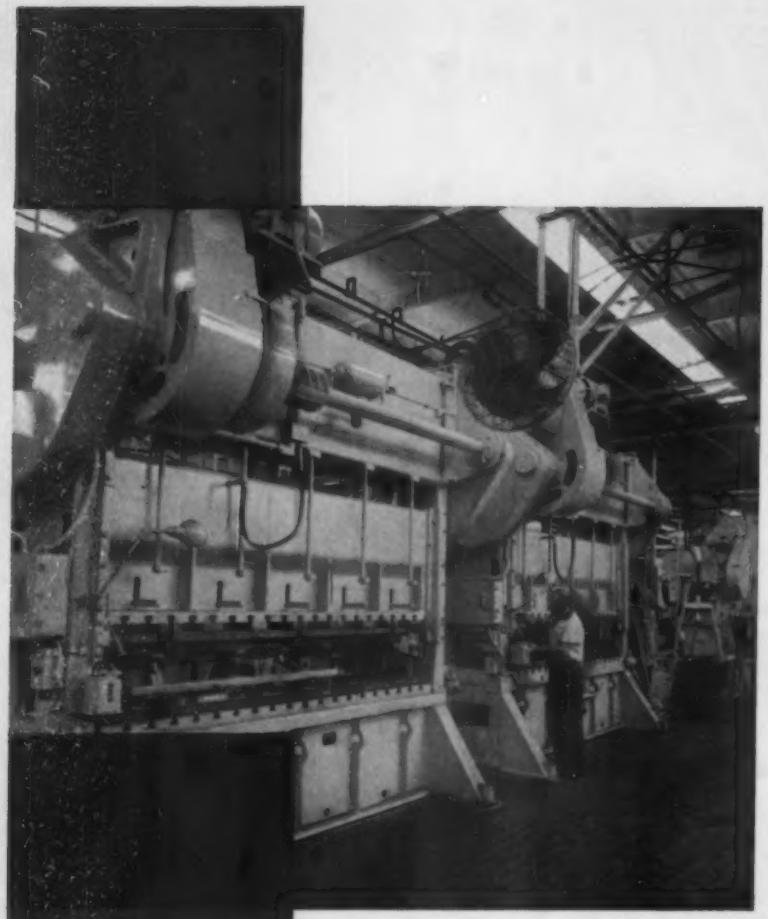
INLAND



Sauce for the Gander?

Like most, you probably have a number of machines on your production line that were equipped from the start with Bijur Automatic Lubrication. If so, you've probably noticed that these Bijur-equipped machines cost slightly less to maintain and are slightly better producers than most of their neighbors. On one machine, of course, the difference may be small. But multiplied by the total number of machines on your production line, the difference becomes one that your Cost Accounting will spot just as quickly as your machine operators.

And it can be done. Bringing every machine up to par with a Bijur Lubricating System is a lot easier than you might expect. Inexpensive, too. Why not write today for complete information on how (and for how little) Bijur can be added where needed?

BIJUR LUBRICATING CORPORATION

153 West Passaic Street • Rochelle Park, New Jersey

Pioneers in Automatic Lubrication

4215

NAMES IN THE NEWS

Sunbeam Equipment Corp, Meadville, Pa, manufacturer of heat treating furnaces has appointed **Jonathan Smith** vice president, sales

A B Dick Co, Chicago, has elected **Karl R Van Tassel** president to succeed **Albert B Dick III** who has been named board chairman and will continue as chief executive officer. Mr Van Tassel has been executive vice president.

Flo-Tronics Inc, Minneapolis, has appointed **William Peters** division manager of its Air Conveying Division. He was formerly engineering manager for Fluidizer Co.

Hupp Corp, Cleveland, has named **Daniel N Gredys** general manager of the Perfection Division which manufacturers air conditioners and furnaces. He was previously vice president, engineering.

Auto-Load Machine Co, Belleville, Mich, has appointed **Harry J Jacob Jr** chief engineer.

Tuthill Pump Co, Chicago, has named **Bernard J Bartnicki** purchasing agent. Prior to joining the firm Mr Bartnicki was production manager of the Howard Foundry Co of Chicago.

OBITUARIES

James S Ervin, 75, for many years the president of the **Mackintosh-Hemphill Co,** Pittsburgh, died March 7. He became a director and member of the executive committee of **E W Bliss Co** in 1955 when Mackintosh-Hemphill became a Bliss division.

Leslie H Middleton, 56, former vice president and director of engineering for **Electric Autolite Co,** Toledo, died March 6. •

BATH *Tap'n Gage* TIMES

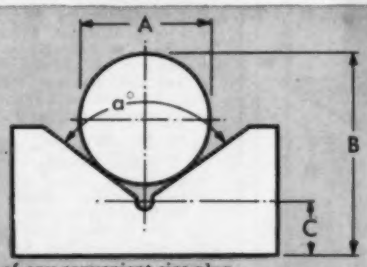
A series of technical discussions that will be helpful in getting better results from tapping and gaging operations

Vol. 1 No. 13

Subject: Thread Inspection of Taps with 3, 5 and 7 Flutes (Unified and American)

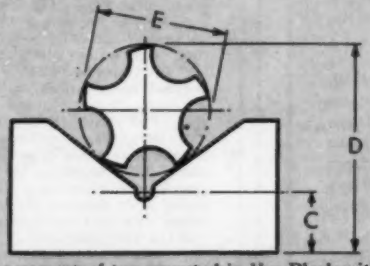
Pitch diameter and major diameter measurement of odd flute taps presents problems not found in checking even flute taps because the flutes are not opposite each other. This inspection plan provides a simple method of measurement so that the actual major and pitch diameters of taps having 3, 5 or 7 flutes may be determined. The so-called size of Vee Block (C) is found as shown by Figure 1. This size should be etched on the block for use in the formulas. The thickness of block is suggested as equal to at least 3 pitches, but not less than 5/16" thick for ease in handling. Complete equipment for this plan consists of precision Vee Blocks, measuring wires and micrometers.

Fig. 1



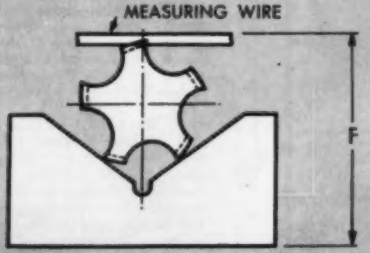
A = Dia. of any convenient size plug
B = Measurement of size plug mounted in Vee Block
C = Size of Vee Block

Fig. 2



D = Measurement of tap mounted in Vee Block with cutting edges in contact with sides of angle
E = Major Dia. of tap

Fig. 3



F = Measurement over Vee Block of tap with a wire inserted in the thread space at the cutting edge

FORMULAS

3 FLUTE TAPS

a° = angle of Vee Block = 60°

1. $C = B - \frac{3A}{2}$ 2. $E = \frac{2(D - C)}{3}$

3. $D = \frac{3E}{2} + C$

4. Pitch Dia of tap = 2(F − D) + E − *Constant for wire

5. $F = \frac{\text{Pitch Dia. of tap} + \text{*Constant for wire} - E}{2} + D$

5 FLUTE TAPS

a° = angle of Vee Block = 108°

1. $C = B - 1.118A$ 2. $E = \frac{D - C}{1.118}$

3. $D = 1.118\ E + C$

4. Pitch Dia. of tap = 2(F − D) + E − *Constant for wire

5. $F = \frac{\text{Pitch Dia. of tap} + \text{*Constant for wire} - E}{2} + D$

7 FLUTE TAPS

a° = angle of Vee Block = 128° − 34′ − 18″

1. $C = B - \frac{2.1099A}{2}$ 2. $E = \frac{2(D - C)}{2.1099}$

3. $D = \frac{2.1099E}{2} + C$

4. Pitch Dia. of tap = 2(F − D) + E − *Constant for wire

5. $F = \frac{\text{Pitch Dia. of tap} + \text{*Constant for wire} - E}{2} + D$

*The "best size" wire and constant may be found in Bath Catalog No. 55, Page 86, Columns 3 and 4. When "best size" wires are not available, use wires large enough to project above the crest of thread, and small enough not to ride on crest of thread.

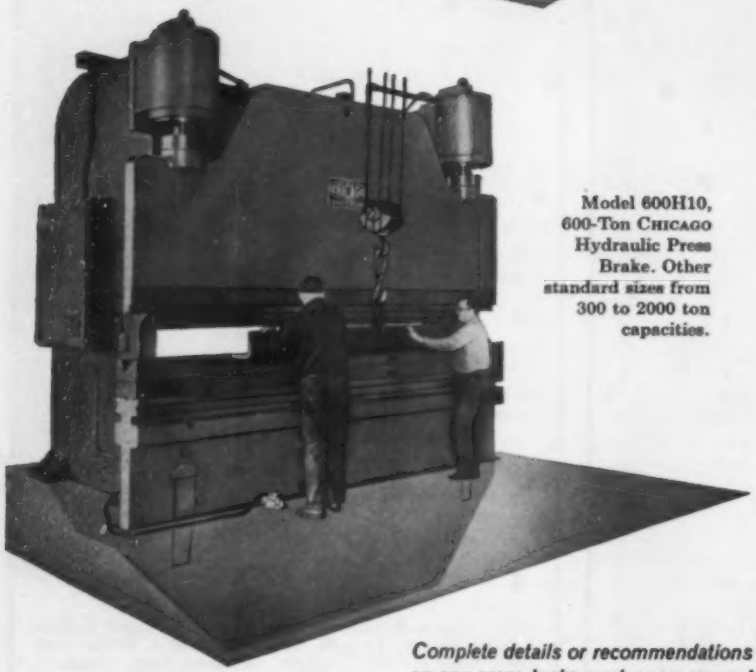
Constant = (3x wire diameter)—(single height V-Thread)

• Cylindrical and Thread Gages • Ground Thread Taps • Internal Micrometers John BATH & Co., Inc.
22 Mann Street, Worcester, Mass.

CHICAGO® PRESS BRAKES

unexcelled accuracy / ***for sheet metal and plate work***

Model 410D, 90-Ton CHICAGO Mechanical Press Brake. Other standard sizes from 11 to 450 ton capacities.



Model 600H10, 600-Ton CHICAGO Hydraulic Press Brake. Other standard sizes from 300 to 2000 ton capacities.

Complete details or recommendations on any press brake work upon request

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Press Brakes
Press Brake Dies
Straight-Side-Type Presses
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Free Literature

To order any of these bulletins, circle corresponding number inside back cover.

MACHINES AND ATTACHMENTS

1 ENGINE LATHES—*R K LeBlond Machine Tool Co, Madison at Edwards Rd, Cincinnati 8, Ohio.* 16-page bulletin R-206 pictures and describes the 21 and 24-in. Regal engine lathes. Discusses the forces of turning which every lathe must withstand to maintain its accuracy, and new Regal design features that dissipate these forces. Descriptions and specifications of the Regal 21 and 24-in. plain and sliding bed gap lathes are also included.

2 HYDRAULIC PRESS BRAKES—*National Automatic Tool Co, Richmond, Ind.* 8-page bulletin. 400 contains illustrated information on five Natco models of 200 to 500-ton capacity. Features include dual-acting hydraulic cylinders which are linked by a mechanical torsion bar to assure equalized die pressures. Die lengths vary from 144 to 200.5 in. Cycle time is from 15 to 22 seconds per stroke. Daylight dimension for all models is 16 in.

3 METALWORKING EQUIPMENT—*Di-Acro Corp, 512 8th Ave, Lake City, Minn.* 32-page catalog 61 gives detailed information and costs on all hand and power-operated Di-Acro metalworking machines. Additional pages list related accessories and expendables including single station punches and dies, adjustable punches and dies, standard V-type press brake dies, Rol-Form and Snap-Form dies. Ten basic machines are available in 46 sizes.

4 FOURSLIDE MACHINES — *A H Nilson Machine Co, 600 Bridgeport Ave, Shelton, Conn.* 32-page design and tooling handbook contains an introduction to the Fourslide process, a method of forming wire or ribbon metal parts using up to four slides operating in a horizontal plane. Seven examples of tooling illustrated and described include: using the Fourslide for winding operations on wire; miniature electronic spring temper ribbon metal parts produced at high speeds, holding close tolerances; forming ribbon metal into a tubular spring; assembly operations on a Fourslide, eliminating special machines; welding and forming wire in one operation. Detailed specifications included.

5 TAPPING MACHINE — *Kaufman Mfg Co, Manitowoc, Wis.* 4-page bulletin covers the Model 10E-20. In addition to fully describing the equipment, with complete specifications, the folder illustrates work done on various Kaufman machines with data and descriptions of Models 10E-126 and 10E-1125.

6 HAND OR FOOT-OPERATED PRESSES—*J F Kidder Mfg Co, 426 Colchester Ave, Burlington, Vt.* 16-page catalog 50-1961 pictures and describes Little Blacksmith units including combined punch, shear, and bender; deep throat punches; new Model 61 shear, notcher, and punch; sheet metal notchers including new Model 60; special purpose machines; attachments; punches and dies.

7 MILLING SPINDLES — *Colonial Broach & Machine Co, Contour Milling Division, 21601 Hoover Rd, Warren, Mich.* Bulletin CMS-61 contains operating data and specifications for line of constant-horsepower infinitely-variable-speed standard milling spindles. Available in an almost unlimited combination of ratings and speeds up to 50 hp, the line covers four basic series, each with four basic models. Dimensions of importance in adapting these spindles on existing machine tools are included.

8 RIVET-SETTING MACHINES — *Judson L Thomson Mfg Co, Sawyer Rd, Waltham 54, Mass.* 4-page illustrated

bulletin gives information on automatic units and rivets available in a wide range of types, materials, and finishes. Tables show typical dimensional ranges.

9 TAPE-CONTROLLED TURRET PRESS — *Wiedemann Machine Co, 201 Gulph Rd, King of Prussia, Pa.* Check list covers over 100 costly factors simplified or eliminated by Wiedematic tape-controlled turret punchpresses. Bulletin also contains details and specifications on line of these presses.

10 9-SPEED MILLING SPINDLE — *Futurmill Inc, 6360 Highland Rd, Pontiac, Mich.* Illustrated data sheet provides information on Series 5225, a 30-hp 9-speed transmission spindle with speed range of 50 to 1150 rpm. Series are designed for planers and planer mills as a conversion unit.

TOOLS AND ACCESSORIES

11 PRECISION SURFACE EQUIPMENT — *Challenge Machinery Co, Grand Haven, Mich.* 2-page catalog 840 contains descriptive data and specifications on over 400 different types and sizes of equipment for layout, tooling, manufacturing, and inspection. Covers angle plates; bench blocks and plates; granite surface plates; straight edges; box angles; right angle irons; V-blocks; heavy-duty work benches.

12 ABRASIVE PRODUCTS—*Carborundum Co, PO Box 337, Niagara Falls, NY.* 52-page "Catalog of National Standard Abrasive Belts, Rolls, Sheets and Discs" lists standard coated abrasive products used throughout industry. All items listed are maintained in stock.

13 RELIEF-GRINDING FIXTURE — *Harig Mfg Corp, 5757 W Howard St, Chicago 48, Ill.* 4-page illustrated brochure shows how to use this fixture to grind any type of drill, and to do cam-relief grinding on an endless variety of tools. Also described are the infinite cam adjustments, how to locate tools in the fixture, grinding flutes, Helixpoint, setups for sharpening taps and piloted countersinks.

14 GAGES—*Taft-Peirce Manufacturing Co, 32 Mechanic Ave, Woonsocket, RI.* 16-page catalog 615 illustrates and describes the Model E and Model D CompAIRators; the CompUtair; CompAIRamatics; air plugs, rings, and snaps, air capsules.

AM/MM

"I'm going to like working here. Now could you show me the suggestion box? I'd like to recommend a few changes."

THERE'S MORE TO TAPS THAN MEETS THE EYE!

LET'S FACE IT . . .

You will not notice a major difference when you visually compare the same style standard High Speed Steel, ground-from-the-solid taps made by Jarvis with those made by another quality manufacturer.

They will look alike, measure alike . . . they are made of quality steel. With this apparent similarity . . .

. . . THEN WHAT ARE THE IMPORTANT POINTS TO CONSIDER IN SELECTING TAPS?

Selecting the *right tap for the job* is vitally important for top tap performance. Regardless of its quality, the wrong tap cannot do the job properly. And, as you know, poor tap performance can be costly.

3 KEY POINTS TO REMEMBER

The differences in ground thread taps become apparent in their performance. The key to proper tap selection lies in these three critical areas:

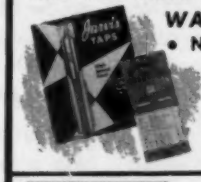
1. Selecting the correct tolerance with respect to tapped hole limits.
2. Selecting the correct type of chamfer, chamfer relief, flute contour and pitch diameter relief.
3. Selecting the style of tap as regards number of flutes, or whether it should be spiral pointed or spiral fluted.

HOW TO GET HELP FOR PROPER TAP SELECTION

Jarvis has gone to great lengths to make tap specifying information available. The new Jarvis Tap catalog has a complete section devoted exclusively to engineering information and guidance for tap selection. Also, Jarvis offers its now-famous, handy pocket-size Tap Selector Guide. Both are free for the asking.

In addition, Jarvis sales-engineers are always ready to help solve your tapping problems.

THERE IS A BIG DIFFERENCE IN TAPS AND IN THEIR PERFORMANCE. YOU CAN PROVE THIS TO YOURSELF BY DEPENDING ON JARVIS THE NEXT TIME YOU ORDER TAPS.



WANT ONE OR BOTH?

- **New Jarvis Tap Catalog** (includes 25-page engineering section)
- Jarvis Pocket-Size Tap **Selector Guide**

JARVIS TAP-OF-THE-MONTH

JARVIS PIPE TAP

NOTE SMALL SHANK

For many years, pipe taps have been made with standard stub shanks. The diameter and length of the stub shank made it difficult to correctly chuck the pipe taps in tapping attachments.

To overcome this problem, Jarvis furnishes ground thread pipe taps, #1716 and #1817, with small shanks (hand tap shank dimensions) in the various American Standard Pipe Forms from stock at regular prices.

Another reason for you to consider Jarvis when ordering taps.

5 JARVIS TAP FACTS

1. Years of experience in the manufacture of High Speed Steel ground-from-the-solid taps *exclusively*.
2. Rigid quality control throughout the manufacturing process.
3. Extensive experience in tapping space age materials.
4. Complete stock of Standards for immediate shipment.
5. Exceptional service on Specials.

Jarvis CORPORATION

- HAND TAPS • NUT TAPS
- MACHINE SCREW TAPS
- TAPPER TAPS • PIPE TAPS • STUB TAPS
- PULLEY TAPS • COLD FORMING TAPS

ALL TYPES OF SPECIALS!

FOR QUICK ACTION USE COUPON

JARVIS CORPORATION 10 Washington Park
North Attleboro, Mass.

☐ Send Tap Catalog
☐ Send Tap Selector Guide

Name_____ Title_____

Company_____

Street address_____

City & State_____

Spotlights on standards...

the four American Presidents, carved out of the mountainsides, set standards which contemporary "public servants" might well emulate. This scene is particularly awe-inspiring at dusk, spotlighted by Crouse-Hinds, manufacturers of industry's standards in special purpose lighting, explosion-proof electrical equipment enclosures, traffic control equipment, and world-famous condulets.

30 YEAR OLD MEAKER "AUTOMATIC" PLATES 65-70 TONS OF PRODUCTS EVERY EIGHT HOURS AT CROUSE-HINDS CO.

In operation for over 30 years, the MEAKER AUTOMATIC at Crouse-Hinds, Syracuse, New York, turns out 65-70 tons of zinc plated condulets every eight hours. What's more, no down time has been recorded in all these years as the fault of the machine.

Reports Mr. Floyd Quinn, Plating Foreman: "Our MEAKER was installed in 1929 to handle condulets up to ¾" diameter. We have been processing from ¾" *up to 6" diameters for years,* with no modification to the equipment." That's versatility!

No wonder Mr. Quinn adds: "If we were to install another automatic plater tomorrow, we'd insist on a MEAKER with little change from the one we have."

MEAKER has been building automatic processing equipment for continuous or batch type metal finishing since 1899 . . . from "compact-a-matic" units occupying minimum floor space and for limited production requirements—to the world's largest automatic plating installation which occupies over 180,000 square feet and produces 4½ acres of plated surface every 16 hours.

Our catalog "WHEN TO AUTOMATE" will give you some valuable ideas for improving. profits through automatic plating or metal finishing

MEAKER 1899

THE MEAKER COMPANY

SUBSIDIARY OF SEL-REX CORPORATION

Nutley 10, New Jersey

Factories and offices Chicago 50, Ill., Los Angeles, Cal. and Nutley 10, N. J.

Free Literature

To order any of these bulletins, circle corresponding number inside back cover.

15 MULTI-POINT CONTROLLER — *Thermo Electric Co, Saddle Brook, NJ.* 8-page Instrument Section No. 52 provides information on new Thermo Electronic controller for accurate, automatic two-position control of up to 10 industrial processes; three position control of 5 processes; constant control of a single process; manual balance indication of exact process conditions at each point controlled and monitoring facilities for controlled points or other operations. Illustrations show the instrument controlling various machines or processes. Specifications cover all characteristics including its use with all standard sensing elements.

16 GAGE PARTS — *Boice Gages Inc, Hyde Park, NY.* 64-page catalog of replacement parts and spares for high precision dial indicator gages and setmasters contains exploded drawings of each gage to permit quick reference to part names, numbers, and prices. Facing pages offer precise instructions for disassembly, reassembly, and setting of the gages, with each step numbered in sequence. Contents of the book are classified by category: Boice bore gages; bore gage setmasters; snap gages; groove gages; large diameter gages and setmasters.

17 DRY LUBRICATING STICK — *Alpha-Molykote Corp, 65 Harvard Ave, Stamford, Conn.* Data sheet 128 illustrates applications of Molykote solid-film lubricating sticks, particularly useful on grinding wheels and cutting tools. When machined to shape it can be used as a self-lubricating bearing element in small machines.

18 DRILLING TOOLS — *Dumore Co, 1300 Seventeenth St, Racine, Wis.* 6-page condensed bulletin D-60-C contains brief descriptive details, ordering information, and use information on Dumore portable precision drilling tools for holes from 0.001 to ⅝ in.

19 COLLOIDAL DISPERSIONS—*Acheson Colloids Co, Port Huron, Mich.* 4-page illustrated publication, the "dag Disperser," (formerly published quarterly, now issued six times a year starting Jan-Feb 1961) contains case histories on how these dispersions are being effectively used in a wide variety of new and established applications.

AM/MM

"For four years when I pushed this button it's been tinkle, tinkle, boing, but now with this new order it's boing, boing, tinkle."

CIRCLE 321 READER SERVICE CARD ▶

BY THE TIME YOU FINISH YOUR SMOKE

Step into any plant equipped with a Danly Quick Die Change Press —and watch! You'll see the Q.D.C. change dies in less time than a cigarette takes. As one self-propelled bolster assembly rolls the old die out of the press, another one rolls the new die in. And the press goes right back into production on a new part. Think of the hours of profitable production you'll gain with this time-saving Danly development. Think of the efficiency you'll get on short-run production. And while you're thinking about it, decide right now to find out more about the Danly Q.D.C. Press.

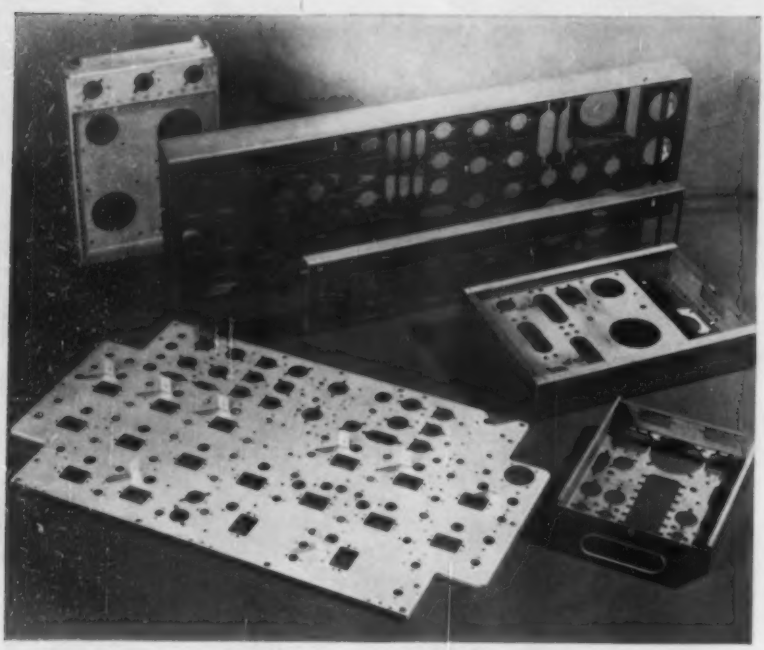
DANLY®

BULLETIN Q.D.C.-1 Tells how the Danly Quick Die Change Press can drastically reduce your die change downtime. Write for your copy.

PRECISION PRESSES, DIE SETS AND DIEMAKERS' SUPPLIES

DANLY

DANLY MACHINE SPECIALTIES, INC., 2100 South Laramie Ave., Chicago 50, Ill.



PUNCH COMPLICATED PATTERNS FAST

With the new improved STRIPPIT 15-A Fabricator, complicated patterns of round and shaped holes can be produced quickly and accurately in sheet material. A high speed punch press that enables you to produce finished pieces directly from drawings, the versatile STRIPPIT 15-A eliminates slow "in-between" tool designing and die making...saves you days or even weeks of valuable time.

The STRIPPIT 15-A features a unique multiple-stop gauging system for positioning work to exact layout specifications. Punches and dies...within easy reach in built-in file drawers...can be switched from one size to another in less than 20 seconds. Designed especially for prototype and short production runs, the STRIPPIT 15-A is easily converted to a high speed production punching unit with the STRIPPIT Duplicator.

The STRIPPIT 15-A:

- **PUNCHES** any round or shaped hole up to 3½" diameter. Maximum material thickness is ¼".
- **NOTCHES** 90° corners—rectangular, radii, vee and special shape edge notches—up to ⅛" capacity in mild steel.
- **NIBBLES** straight line or contour shearing up to 38" diameter circle, at 165 strokes a minute, ⅛" mild steel.

Send now for 15-A catalog. Free demonstration can be arranged right in your own plant.

WALES **STRIPPIT** INC.
200 Buell Road • Akron, New York

UNIT OF HOUDAILLE INDUSTRIES, INC.

In Canada: Strippit Tool & Machine Company, Brampton, Ont.; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: E. H. Jones (Machine Tools) Ltd., Hove, Sussex, England.

Free Literature

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HEAT TREATING AND WELDING

20 MECHANICAL CONVECTION OVENS—*Blue M Electric Co, 138 & Chatham St, Blue Island, Ill.* 12-page bulletin 1960 presents illustrated description of Power-O-Matic 60 units with saturable power reactor control.

21 HUMP MESH-BELT FURNACE—*General Electric Co, Schenectady 5, NY.* 4-page bulletin GED-3990 describes features and advantages of unit for continuous bright brazing, heat treating or sintering of stainless steel up to 2200 F. Illustrated publication also contains furnace dimensions, ratings, and performance curves, and lists optional equipment available.

22 WELDING, SOLDERING, BRAZING PRODUCTS—*All-State Welding Alloys Co, White Plains, NY.* 4½-page user's catalog folder provides a reference to standard and specialty products. Charts and tables summarize alloy selection. Fluxes are featured in a special section.

23 ARC WELDING PRODUCTS—*Lincoln Electric Co, 22801 S Clair Ave, Cleveland 17, Ohio.* 40-page bulletin 7000.7, "Weldirectory of Arc Welding Electrodes, Equipment, and Supplies" presents information on AWS electrode classification and discusses correct electrode selection for every type of welding application. Supplies descriptive information on the performance and construction features of full line of arc welders, electric and gas engine driven generators, transformer and transformer rectifier designs, and welding supplies.

24 ELECTRONIC WELDING EQUIPMENT—*Hughes Aircraft Co, Vacuum Tube Products Division, 2020 Short St, Oceanside, Calif.* Short-form catalog describes company's thin metal welding equipment line. Illustrates nine different power supplies and eight different weld heads and handpieces.

PLANT SERVICE EQUIPMENT

25 TROLLEY CONVEYORS—*Link-Belt Co, Prudential Plaza, Chicago 1, Ill.* 58-page book 2730 tells what such a conveyor can do to reduce manufacturing and handling costs, and how to select the right one for any requirement. Examples of

AM/MM

"Room for one more, near the spigot?"

WALKER CERAMAX

TURNING

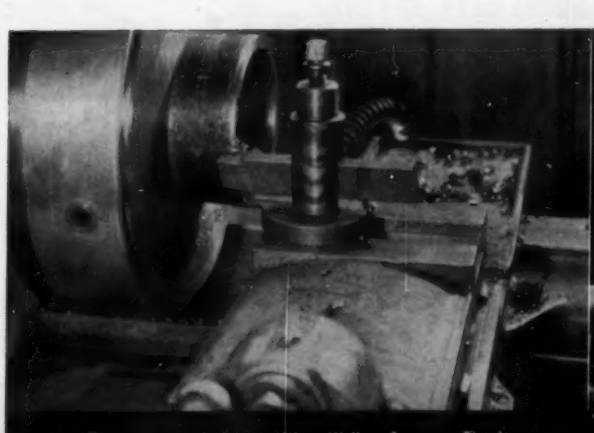
Walker, for the first time in machine tool history, offers safe magnetic holding for lathes. Ceramic magnets in Walker Rotary CERAMAX chucks are not subject to electrical power failure and have three times greater coercive force than ordinary Alnico magnets. With uniform holding power over the entire face of the chuck, safe, accurate turning, facing or trepanning is accomplished in a single set-up.

For dependable, trouble free operation specify Walker CERAMAX Chucks.

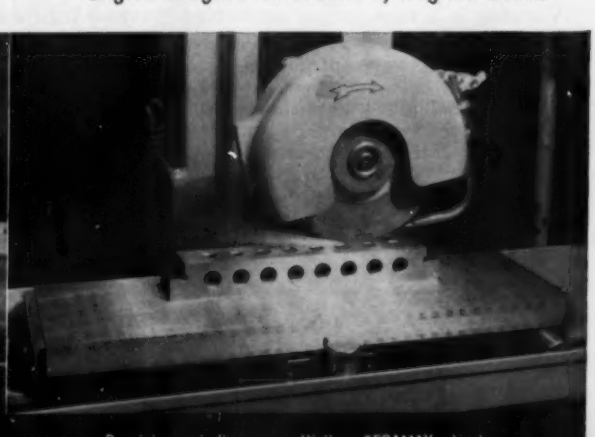
GRINDING

Walker CERAMAX chucks provide all the holding power needed for standard grinding operations and with fine pole divisions are ideal for thin, small work as well as large, heavy pieces. All-steel top plate minimizes redressing to reduce non-productive machine time. Ceramic magnets retain magnetism permanently, eliminate constant recharging.

O.S. Walker Co., Inc.
ROCKDALE ST. • WORCESTER 6, MASS.
Original Designers and Builders of Magnetic Chucks



Turning a steel sleeve with a Walker Ceramax Chuck



Precision grinding on a Walker CERAMAX chuck

Today's most Compact, Variable Speed Package Drive for constant H.P. and constant Torque loads

New space-saving Cleveland motorized Speed Variator

Now, for either OEM applications or to modernize existing machines and equipment, these versatile, precision-engineered Speed Variators can be used in place of larger variable speed drive units and their connecting electrical drives. If there's room for a motor —an equally sized Cleveland will usually fit in the space.

Here's the complete Motorized Speed Variator story:

- Requires only slightly more space than equally rated standard electric motor
- Provides variable output speeds over 9:1 and 6·1 ranges
- A complete line featuring 5 sizes from ½ to 15 HP
- Integral "pancake" style AC radial air gap motors conforming to NEMA design "B" specification
- Provides speed holding accuracy up to 0.1% with uniform loading
- Output speeds smoothly and easily adjusted while operating under load

Variator is a true torque converter—provides high torque at low speeds for constant HP applications.

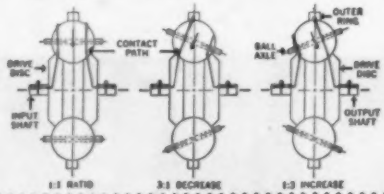
Utilizing the component you wish driven, Cleveland will design and build a complete compact pre-aligned and tested Speed Variator drive assembly mounted on a suitable base plate.

New Motorized Variators offer the ultimate in control versatility. They can be engineered for either manual, electrical or pneumatic operation.

For complete engineering information on the New Cleveland Motorized Speed Variator, write for free, illustrated bulletin Number 275 or contact your Cleveland representative today.

How The Speed Variator Works

Power is transmitted through input shaft to a beveled drive disc in contact with axle-mounted alloy steel drive balls. Input shaft rotation causes balls to rotate about their axles. Power is then transmitted from all rotating balls to output shaft by similar ball-disc contact on the output side. Output speed is determined by relative lengths of contact paths on input and output sides of the balls. By tilting both axles and balls, relative lengths of the two contact paths are varied to give increasing or decreasing ratios as shown on sketches.



Cleveland Worm & Gear Division
Eaton Manufacturing Company
3254 East 80th Street • Cleveland 4, Ohio

CLEVELAND SPEED VARIATOR

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installations, from small jobs up to highly complex systems, are shown. Includes complete information for design of a system; tables of materials, dimensions, and specifications of components.

26 OIL BATH AIR CLEANER—*American Air Filter Co, 215 Central Ave, Louisville 8, Ky.* 8-page bulletin 160-C pictures and describes low resistance Model C Type P Cycoil with pneumatic oil lift. Component parts, their construction and action, are illustrated; dimension drawings and capacity and resistance curve graphs, as well as instructions for installation are included. Proper maintenance, oil recommendations, filter cell service, model size selections, and efficiencies and dust-holding capacities are discussed.

27 FINISHING AND PROCESSING EQUIPMENT—*R C Mahon Co, PO Box 4866, Detroit 34, Mich.* 12-page catalog A-661 shows range of equipment that the firm engineers, fabricates, and installs. These cover metal cleaning and surface preparation, pickling or rustproofing; spray booths; drying, baking, and processing ovens; complete finishing systems; special processing equipment; Mahon-designed control components; dust and fume control equipment.

28 LIFT TRUCKS — *Allis-Chalmers Manufacturing Co, Milwaukee, Wis.* 16-page catalog BU-660 covers line in the 2000 to 10,000-lb capacity ranges. Components and power plants pictured; power curves and specifications for each truck included, plus data on matched attachments.

29 METAL FINISHERS — *Meaker Co, Nutley 10, NJ.* 29-page illustrated booklet, "When to Automate," describes a range of machines and equipment designed to automate metal finishing operations. Illustrates new types of automatic machinery currently in use by electronic firms for mass production processing. Tables show electro-chemical equivalents of base and noble metals; data on depositing zinc, copper, tin, nickel, cadmium and chromium; and separate tables for use with acid, cyanide, and other recomended solutions.

30 AXIAL-FLOW FANS — *L J Wing Mfg. Co. 2300 N Stiles St, Linden, NJ.* 16-page illustrated bulletin AFF-61 contains information on fans for heating, cooling, ventilating, fume removal, and drying systems. Fans with direct-connected motors and designs with V-belt drive are

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"I think Wilson is about ripe for another lecture on housekeeping."

THE WORLD'S MOST MODERN GRAVITY DROP HAMMER--

The IMPROVED CECO-DROP

1. PROVEN: The CECO-DROP is a proven tool, the original "Boardless Board Drop Hammer", with international acceptance.

2. ALL OVER THE WORLD: More than 450 CECO-DROPS are in service in more than 140 forge shops all over the world. Many companies have initiated programs looking toward complete conversion to CECO-DROPS.

3. NEW STANDARDS: The CECO-DROP has created new standards of performance and established new standards of tolerance in drop forgings. The new Blowmatic feature permits programmed control over the production sequence.

4. HAMMERMEN PREFER: Hammermen prefer the CECO-DROP. Treadling is easier. Leg fatigue is minimized. Working area is clear.

5. LESS MAINTENANCE: The CECO-DROP costs less to maintain. There are fewer, more durable parts. Automatic lubrication prolongs parts life.

6. ECONOMICAL: The CECO-DROP is economical to operate. Power is used only when the hammer is running.

7. GREATER OUTPUT: The CECO-DROP forges more minutes per hour. It does more forging per blow, requires no board changes —no friction adjustment. Die alignment is maintained—rejects due to mismatch are fewer.

8. SAFER: The CECO-DROP is safer. There are no overhead hazards. It has fewer, lighter mechanisms. It has a safety dog and safety cylinder cover. Power failure stops the hammer and clamps the ram.

9. LESS DIE SET-UP TIME: The CECO-DROP requires less die set-up time. A new Die Setting Control makes die changes easier, quicker and safer. It takes but a minute to adjust the stroke.

10. WIDE RANGE: The CECO-DROP has a wide range of operation due to the unique short stroke control.

Write for new Ceco-Drop bulletin, No. 105-L-1

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PA.

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• The Hammer Builders •

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When it's a vital part, design it to be FORGED

STAINLESS
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covered. Features, construction details, optional equipment, specifications, and tables of capacities and dimensions included.

31 POWER SWEEPER—*G H Tennant Co, 721 N Lilac Dr, Minneapolis 22, Minn.* 4-page illustrated bulletin 85.26 shows operation of the new heavy-duty Model 85. This machine sweeps a 53-in. path (including side brush), and picks up both heavy litter and fine dust in one operation.

32 POLISHING AND BUFFING MACHINES—*Acme Manufacturing Co, 1400 E Nine Mile Rd, Detroit 20, Mich.* 20-page catalog AM-52 presents illustrated description of complete line of semi-automatic machines for low production deburring, buffing, and polishing operations, plus newly developed accesories and attachments. Also covered are 12 special machines for specific application requirements such as bowl-shaped parts.

33 SUMP PUMP MOTORS — *General Electric Co, Schenectady 5, NY.* 6-page bulletin GEA-6687A provides information on 1/3-hp, 1725-rpm units available in both standard and deluxe models. Also introduces motor parts for submersible sump pump applications. Photos show moisture resistant insulation, rust-resistant shaft, and permanent lubrication.

PARTS AND MATERIALS

34 VARIABLE SPEED DRIVES—*Reliance Electric & Engineering Co, 24701 Euclid Ave, Cleveland 17, Ohio.* 88-page catalog G-100 covers complete line of Reeves Vari-Speed Motodrives, ¼ through 40 hp. Data includes full rating tables, with new additional output speeds. Dimension diagrams and charts for over 100 different assemblies, new higher overhung load, and new controls, are also included.

35 POWER TRANSMISSION EQUIPMENT — *Browning Manufacturing Co, Maysville, Ky.* 23-page catalog GC-101-F illustrates and describes complete line plus description and listing of thousands of stock parts available. Presents data on complete line of V-belts including such associated items as wide range variable speed belts, Poly-V belts, and gearbelts; malleable iron bushing system; roller chain and sprockets.

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"How could I work 50 years and only be 35 years old? Lots of overtime."

New $300 precision cut-off saw paid for itself during 15 minute production run

Navkut*, the new precision cut-off saw, cut production costs substantially at Unicorn Engineering Inc. (now owned by Computer Measurements Company, Sylmar, California). $8 was once the cost of "spacers"—high precision parts which were originally cut from bar stock in a lathe, then milled and ground to a tolerance of .002". After buying the Navkut saw, the production of spacers was reduced to a simple cut-off operation, and costs were cut to 80c a spacer. During every 15-minute production run, the Navkut saw paid for itself. Today, over two years later, the same Navkut is still being used to great advantage in a wide variety of production work.

An operator can cut parallel tolerances to within .002" with the Navkut cut-off saw. And in most cases, the cut finish and accuracy are so precise there is no need for milling or grinding. The Navkut saw will cut ferrous, non-ferrous, wood, and plastic materials with only two types of blades. It sets up in just 1½ minutes. And yet, with all this precision, the Navkut saw costs only $300.

This is the ideal production cut-off for small shops; the ideal auxiliary cut-off for all shops. See for yourself how the Navkut saw can save you money. Write today for a free 15-minute demonstration in your shop.

*TRADEMARK

Navkut saw is another product marketed by:

NAVAN
INVENTION MARKETING NATIONAL SALES

NAVAN PRODUCTS INC.
Subsidiary of
North American Aviation, Inc.
900/H North Sepulveda
El Segundo, California

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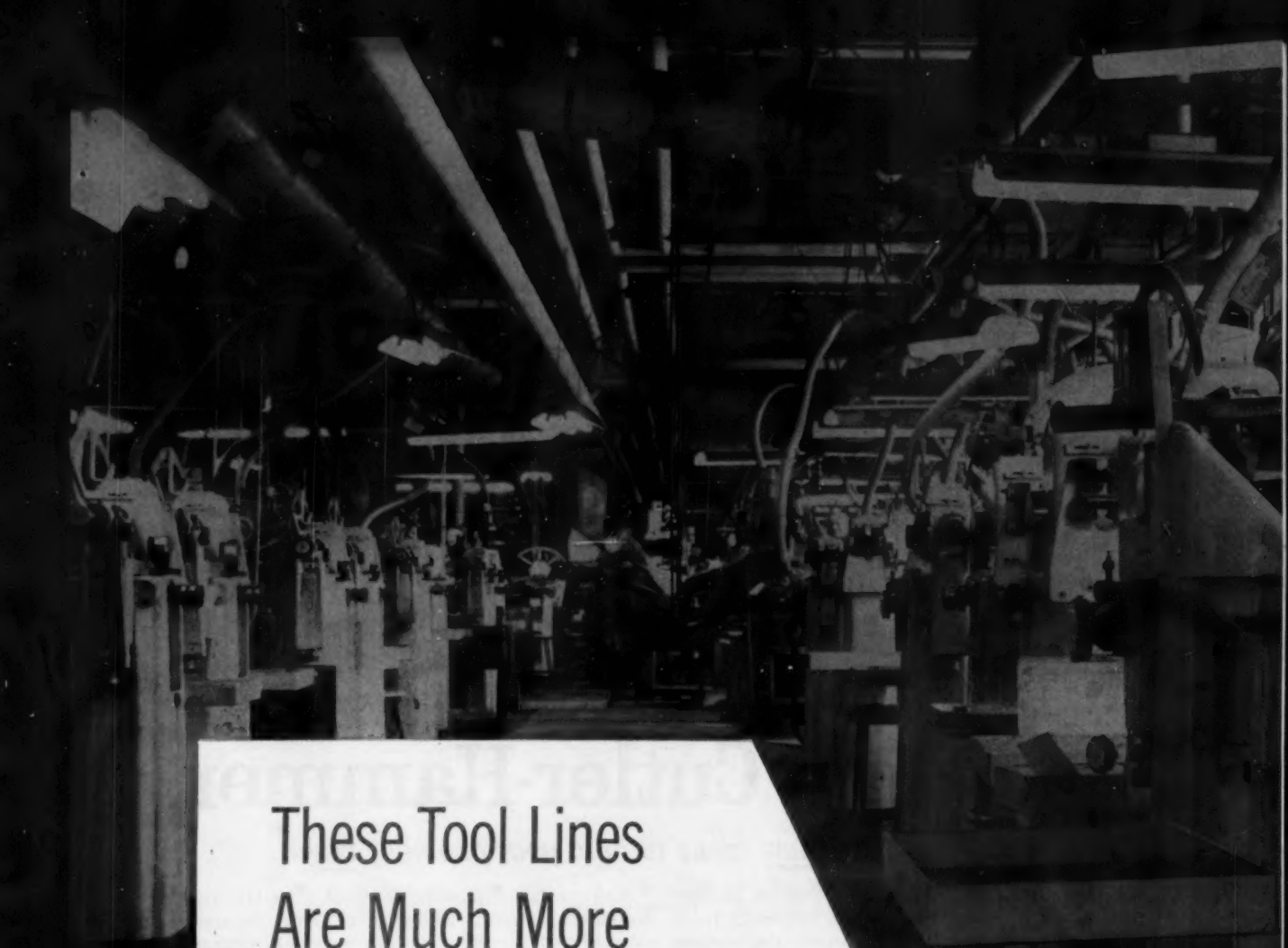


These Tool Lines Are Much More Than Machinery...

They express *confidence* in the ability to serve the needs of a vast industry . . . an industry which expects the highest standards of service and deserves the best possible product that can be produced.

The ability to provide for the widest range of industry's needs is made possible through *plant potential*—represented in the most modern equipment, much of which has been specially engineered and built in our own plant. This capacity permits versatility that enables us to efficiently produce from the smallest to the largest requirements.

To meet the increasing demands for products of *quality*, *accuracy*, and *performance dependability*, National Tool continually invests in the manufacturing tools and equipment essential to maintain the position of superiority it has held so many years in this field.

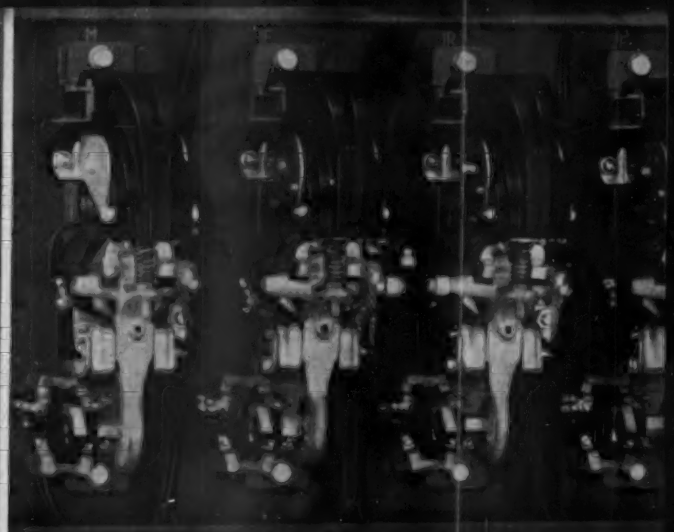
NATIONAL Tools CLEVELAND

NATIONAL TOOL COMPANY
A Division of
National Cleveland Corporation
11200 Madison Avenue **Cleveland, Ohio**

For more than a half century National Tool has supplied high quality precision cutting tools to the metalworking industry.

For your special cutting tool requirements call your National Tool representative.

COMPACT 300 VOLT CONTROL RELAY Space-savingest relay ever! So reliable it is permanently enclosed.



D-C UNITIZED CONTACTORS. For steel or slate panels, front or back wiring. Six sizes 25 to 600 amperes.

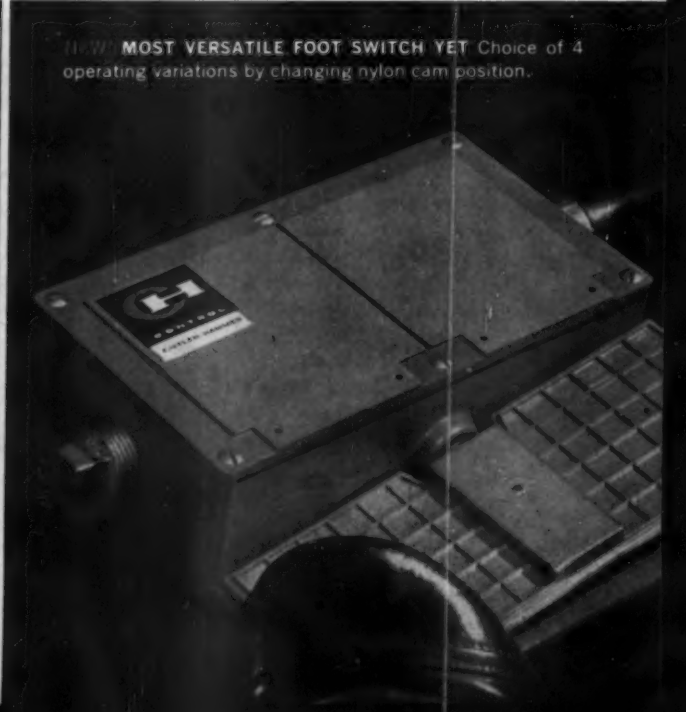
New from Cutler-Hammer

New products, new ideas to help your business now

The air is charged with new ideas at Cutler-Hammer . . . ideas and products resulting from our new production facilities, new engineering talent, new research programs, and most important of all—*a new desire to serve you better in the sixties.* Evidence of this vitality and what it can mean to you are these eight typical new products.

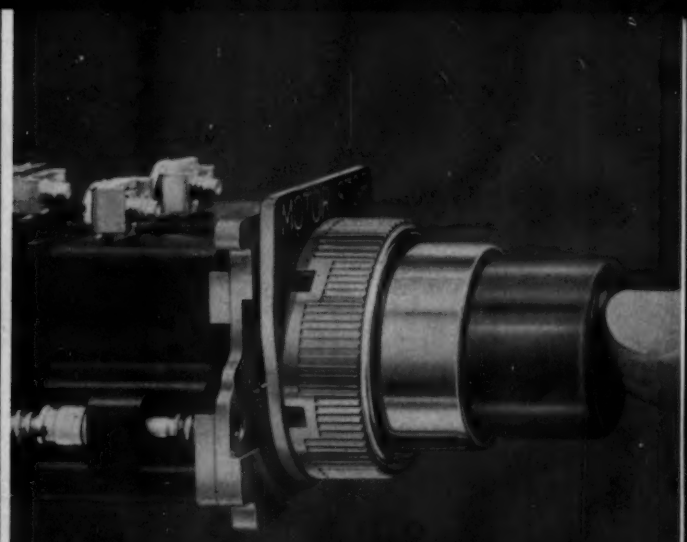
You can expect more news from Cutler-Hammer around the calendar. Give your Cutler-Hammer sales office or distributor a call. They're all charged up too—anxious to tell you more about *what's new at Cutler-Hammer.* For descriptive literature on any of these products, write Cutler-Hammer or call your nearest Cutler-Hammer distributor.

SIZE 5 STARTER Available as starter or contactor. Really small . . . Open dimensions only 13" x 15 5/16" x 7½".



MOST VERSATILE FOOT SWITCH YET Choice of 4 operating variations by changing nylon cam position.

UNITROL DESIGN in choice of three depths (20", 15", 12") gives more flexible motor control center.



ILLUMINATED PUSHBUTTONS Newest addition to this versatile oiltight line. Dozens of types, many colors.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

CONTROL

SPACE-SAVING 00 STARTER Takes 20% less space, costs 18% less than Size 0.

MOST RELIABLE LIMIT SWITCH EVER This oiltight switch outlasts others by far. Many operator options.

Precision Operation In A Compact Design . . . Cuts Costs

LINLEY
JIG BORERS

Designed specifically for tool, model and experimental departments.

The Linley Jig Borer is accurate to a high degree. It is fast to set up and position and has the versatility required for precision tool room and die work, yet is low in cost.

Many time-saving accessories are now available for use with the improved Linley that add to its usefulness and simplify its operation.

Check on the many advantages of this improved jig borer. Table size is 7" x 17½"; table travel, 6½" x 10".

Send for descriptive literature.

LINLEY BROTHERS CO.
664 State Street Ext.
Bridgeport 1, Conn.

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Free Literature

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36 PRECISION SWITCHES — *Micro Switch, Freeport, Ill.* 20-page catalog 104 covers line for industrial, commercial, data processing, airborne, and electronic applications. Contains photos and condensed descriptions of over 200 items including miniature switches, special-purpose switches, electronic switch-circuit assemblies, lighted pushbutton switches, toggle, limit proximity, and mercury switches.

37 HARPER CORROSION GUIDE — *H M Harper Co, Morton Grove, Ill.* 24-page illustrated brochure reviews various kinds of corrosion and the different metals suited to resist them. The guide analyses the seven basic types of corrosion and shows what specific kinds of metals best resist them. Corrosion guide chart lists 136 types of corrosive agents that may cause problems and shows how well each of eight types of metals resist each of these agents. Each of the metals and alloys used in Harper fasteners is described with notes on characteristics, uses, and the chemical and mechanical properties.

38 STAMPED GEARS—*Winzeler Manufacturing & Tool Co, 7355 W Wilson Ave, Chicago 31, Ill.* 16-page catalog 6011 contains illustrated description of various gear types available; tables giving all critical specifications for hundreds of sizes of stamped gears, segments, internals, ring and crown gears, sprockets and ratchets. Data is included on center hole shapes, tooth parts, and diametral pitch rules and formulas for spur gears. Examples are shown of special stampings and assemblies also made by the firm, as well as special tools and gages.

39 AIR ROTARY ACTUATOR—*Ledex Inc, 123 Webster St, Dayton 2, Ohio.* Bulletin PA-50-161 pictures and describes the Series 50 miniaturized, high-speed unit that completes a 90° stroke within 30 to 40 milliseconds. It fits a 1½ x 2-in. package, requires only 0.16 cu in. of air to displace its piston, has no shaft seals, requires no linkages. Action on the output shaft is direct; torque produced at 120 psig is 6.5 in.-lb.

40 ROLLED STEEL RINGS — *Edgewater Steel Co, Pittsburgh 30, Pa.* 11-page brochure describes and pictures the process by which these rings are formed from solid blocks of steel. Ribs,

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Explains how dimensional control techniques are applied in production machining to increase production and reduce unit costs. Describes construction of tolerance charts—use of production operation process sheets—"method of traces" for tolerance evaluation, etc. **By J. L. Gadzala, Boeing Airplane Co. 205 pp., 150 illus., $7.50**

TOOLING FOR METAL POWDER PARTS

A practical manual on the planning, tooling, and production of metal powder parts. Presents facts and data on economics of powder metallurgy, parts design, preparation of powders, briquetting techniques, finishing operations, and more. **Prepared under auspices of ASTME. Edited by G. H. DeGroat,** *American Machinist.* **256 pp., 134 illus., $7.50**

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For one thing, the government promises to step in with new tax policies that will help industry to invest in new tools to narrow "the machine gap". For another, technology is moving fast . . . with new methods, new techniques for making products better, faster, cheaper.

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flanges, grooves, conical surfaces, tapered surfaces, or other shapes are formed during the rolling, minimizing and, in some cases, eliminating the need for further finishing operations. Diameters run from 5 to 180 in.

41 HARD CEMENTED CARBIDE — *Kennametal Inc, Latrobe, Pa.* 16-page pocket-size booklet discusses profitable utilization of high rigidity in a material that has three times the stiffness of hardened steel. Gives typical examples in which this high YME (Young's modulus of elasticity) of Kennametal hard cemented carbide is particularly advantageous. These include components for metal cutting and metalworking as well as for aircraft, missiles and rockets, ordnance, and chemical processing equipment. Wear resistance is up to 100 times that of steel.

42 BALLS—*SKF Industries Inc, Front St & Erie Ave, Philadelphia 37, Pa.* 4-page booklet has ball conversion tables that compare old and new Anti-Friction Bearing Manufacturers' Association standards. Sections describe Atlas balls from 1/32 to 2½-in. dia made of chrome alloy steel; type 440 stainless; type 329 stainless; brass, aluminum bronze; and silicon molybdenum steel. Each section contains engineering data on material, hardness, grades, tolerances, corrosion resistance, uses, magnetic properties, and general information.

43 ULTRA-THIN WELDING TUBE—*Western Pneumatic Tube Co, Kirkland, Wash.* Two availability charts list production limits for this tubing in two forms, cold drawn and bead reduced. The former, Data Memorandum No. 60 B, gives the minimum and maximum wall thickness for various tubing diameters from ½ to 4 in., in both standard and special analyses. Wall thickness can be held as thin as 0.004 in. for all sizes of tubing. Data Memorandum No. 60 C gives minimum and maximum wall thickness for various tubing diameters from 1½ to 10 in. and lists 86 analyses in which it is furnished. Available forms listed.

44 TOOL STEELS — *Heppenstall Co, 4620 Hatfield St, Pittsburgh 1, Pa.* Data Sheets 25 and 26 provide information on three lowcost materials suitable for short run tooling. Sheet 25 covers Grade

AM/MM

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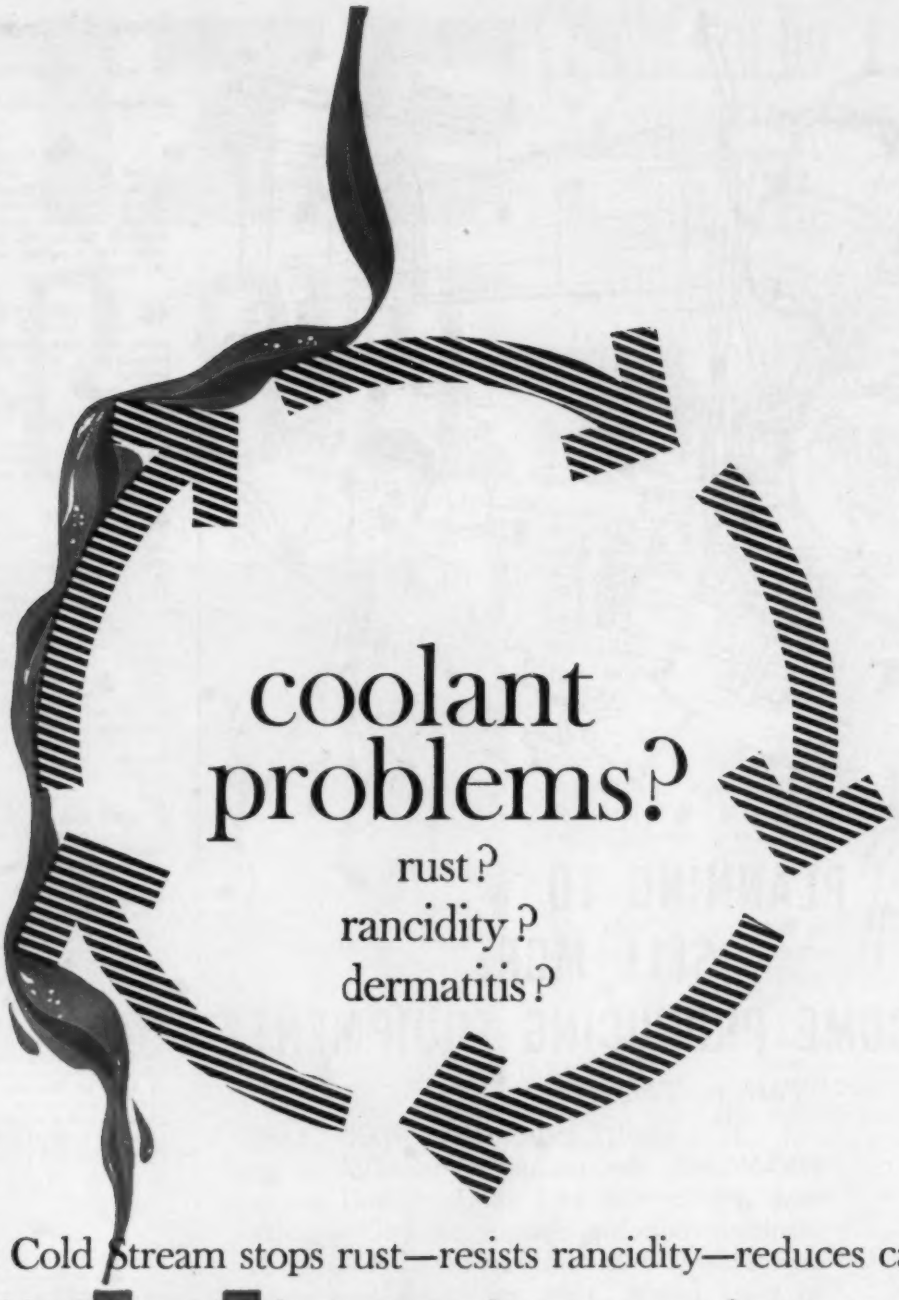

Johnson's Cold Stream stops rust—resists rancidity—reduces causes of dermatitis. These problems start when your coolant gets dirty. Cold Stream stays clean week after week—even on cast iron. Cold Stream gives longest tool life. Finest finishes. Highest speeds and feeds. Best dimensional control. Cold Stream gives you all the performance you pay for. **JOHNSON'S WAX**

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A110, a general purpose carbon tool steel melted by electric furnaces. Sheet 26 discusses Grades 2V72 and 2V90, tradenamed Cartos. Characteristics of all three grades include excellent machinability and shallow depth of hardening. Instructions are provided for forging, annealing, hardening and tempering.

45 MAGNETIC OIL FILTERS — *Sinclair Machine Products Inc, Claremont, NH.* 4-page folder shows typical applications of these filters available in capacities of 1 and 5 gpm. They remove metal particles from coolant, oil, and other liquids which get by screens and most conventional filters and provide positive protection for oil hole drilling and reaming; tapping; threading, burnishing; milling; and all types of lubricating systems.

46 SILICONE MOLD RELEASE AGENTS—*General Electric Co, Silicone Products Dept, Waterford, NY.* 8-page illustrated publication S-13 lists properties of available G-E silicone release emulsions, fluids, and compounds, including reliable release, stability at high temperature, rapid and easy spreading, and chemical inertness which combine to make them ideal for the parting step of the process which requires crisp, clean release of the shell from the pattern. Guide aids in the selection of the proper agent, a description of available materials and their typical properties, as well as suggested techniques for using silicone release agents.

47 PLASTIC PARTS — *Dixon Corp, Bristol, RI.* 4-page brochure 9572 describes characteristics and qualities of Rulon and Teflon, comparing electrical, physical, mechanical, and chemical properties. Numerous Rulon parts made by the company to meet customer requirements for lubefree bearings, O-rings, wear strips, valve seats, thrust washers, and other applications calling for low deformation under load, low coefficient of friction and high compressive strength are illustrated.

48 VARIABLE SPEED BELTS—*Manheim Manufacturing & Belting Co, Manheim, Pa.* 7-page Interchange Guide lists circumference, top width, and number of links of Manheim variable speed belt required for Dayton, Gates, and other rubber belts and Reeves wood block belts. Data on how to compute price of Types I through V MVS belt are included.

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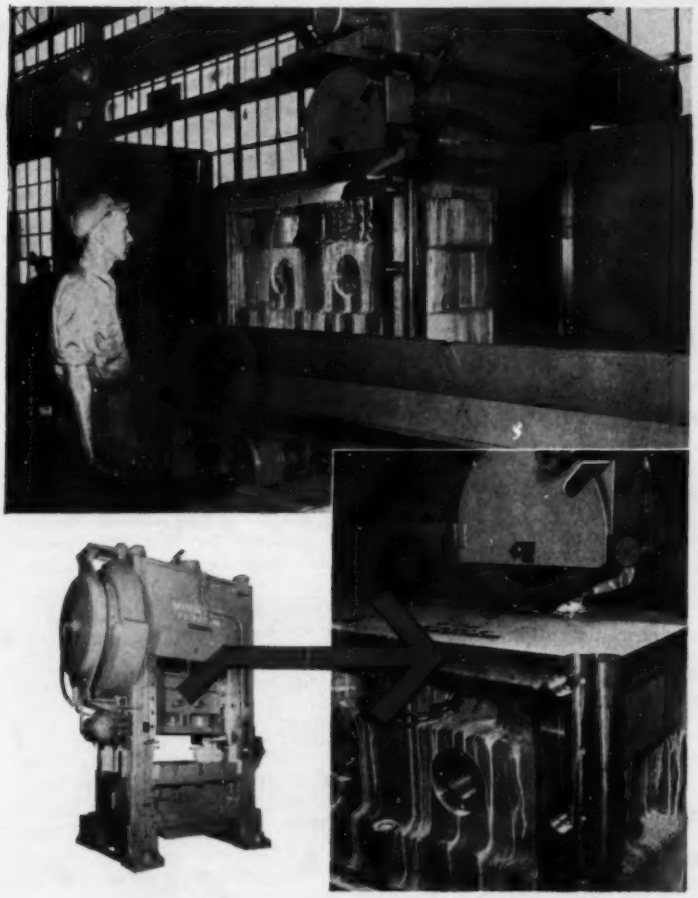
SIZE FOR SIZE

there are no heavier or more accurate surface grinders made than these fast, heavy duty Thompsons



Thompson Type CX heavy-duty surface grinders are designed to grind heavy, massive work pieces. Their stock removal rate is very fast while maintaining extremely close limits of accuracy and microfinish.

Shown here is a Thompson Type CX 30x36x96 machine recently installed in the Minster Machine Company plant at Minster, Ohio. It is grinding the face of the slide for a 200-ton capacity Minster Piece-Maker High Speed Automatic Production press.

The slide is cast iron and weighs approximately 7000 pounds. It is being ground for precise parallelism and to a 20 to 30 RMS finish.

Thompson Grinders have an important part in the production of these world-famous Minster presses. The dependability of Thompson Service and the excellent performance of the Thompson machines now in use at Minster were major factors in the purchase of this latest grinder.

If your production involves the grinding of large, heavy work, it will pay you well to investigate the money and timesaving features of these modern machines.

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"Keep Thompson in mind for that daily grind"

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NEW FILMS...

IT'S YOUR MOVE. *Produced for Conveyor Equipment Manufacturers Ass'n by Modern Talking Picture Service Inc, 3 E 54th St, New York 22, NY. 16mm, sound, color. Running time 24 min. No charge.*

To demonstrate the importance of the conveyor in saving time and making work easier, this film shows a variety of conveyor installations for transportation and distribution in industry and agriculture. It emphasizes that standardization and continuous flow of materials are fundamental to mass production systems, and points out that modern planning requires that plants be built around the conveyor. The film is suitable for vocational and senior high schools, colleges and industrial groups, and may be borrowed from any of Modern's 30 libraries in principal cities. Requests to the New York address will be routed to the nearest regional library.

•

CASE HISTORY: GOLD PLATING TRANSISTOR HEADERS AT PLATRONICS. *Produced by Sel-Rex Corp, 75 River Road, Nutley, N. J. 16mm, sound, color. Running time 8 min. No charge.*

In this film the viewer follows the mechanical and electrochemical procedures involved in gold plating transistors. It supplies detailed information on pilot plant trial runs, prior to production special equipment required for optimum results and minimum rejects; preplate calculations for consistent quality; and quality-control procedures initiated in the trial run, followed through to laboratory tests after plating.

•

MACHINING STAINLESS STEEL, PART II. *Produced for Armco Steel Corp. Distributed by Jam Handy Organization, 2821 E Grand Blvd, Detroit 11, Mich. 16mm, sound. Running time 29 min. No charge.*

Part 1 of this series was issued three years ago, and its enthusiastic reception prompted Armco to continue with a second part. This shows how free-machining steels can be worked at high production rates, as in single—or multi-spindle automatics. Demonstrated are methods for

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improving the performance of drill points for perforating thin sheet and tubing without tearing or leaving burrs, and for improving taps for better chip clearance. How to "get in fast" to prevent burnishing is shown, as are methods of using small precision chucks and presses, and ways of grinding drills by hand. The film is accompanied by a booklet giving details of the operations shown.

•

THE CONSTANT SEARCH. *Produced by Modern Talking Film Service Inc, 3 E 54th St, New York 22, NY. 16mm, sound, color. No charge.*

Tells the story of the first industrial power application of the stationary jet aircraft engine RT-248. The development of this engine for a natural-gas compressor station is traced from design to installation. The engine is shown in operation as it develops 10,500 hp to pump 600 million cu ft of natural gas a day, but never reaches maximum speed, temperature or stresses.

The film is made available by the Columbia Gas System to technical schools, colleges, and interested adult groups and may be obtained from Modern film libraries in the areas served by the gas system. Requests directed to the New York office will be routed to the nearest local library.

•

THE CYCOLAC STORY. *Produced for Marbon Chemical Div, Borg-Warner Corp, Washington, W Va. 16mm, sound, color. Running time 30 min. No charge.*

Using the technique of a "film within a film," this new motion picture shows a salesman discussing Cycolac plastic with a prospective customer and demonstrating its many uses by means of a film. Actual production shots show high-speed economical injection molding and vacuum forming of telephone, refrigerator, and adding machine components, and demonstrate the minimized finishing operations and simplified final assembly.

Comparisons with eight other plastics are made by colored charts which contrast the differences in cost, impact strength, low-temperature impact, tensile modulus, heat deflection and hardness. •

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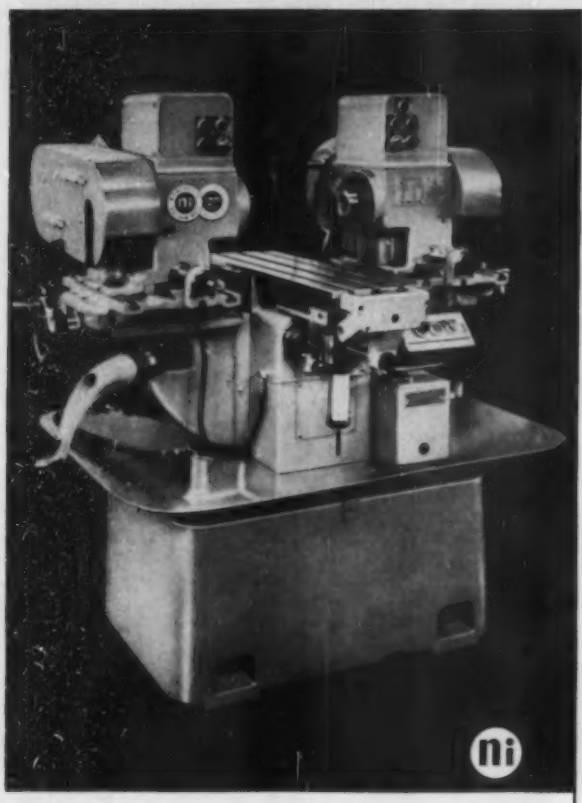

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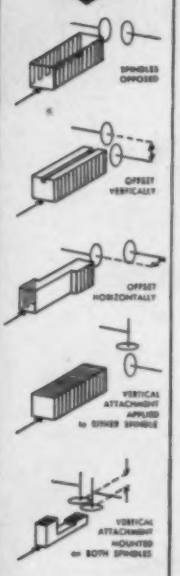

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METAL-CUTTING AT MORE THAN 100,000 SFPM?

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NEW BOOKS...

HEAT TREATMENT AND PROPERTIES OF IRON AND STEEL—*By Thomas G Digges and Samuel J Rosenberg, National Bureau of Standards Monograph 18. Order from Superintendent of Documents, US Government Printing Office, Washington 25, DC. 40 pages, 35¢.*

This monograph has been prepared to give an understanding of heat treatment principles to those unacquainted with this subject. To this end, the basic theoretical and practical principles involved in the heat treatment of iron and steel are presented in simplified form. This is stated in the announcement of the publication.

How well does the monograph live up to this promise? Very well, indeed. The descriptions of the various processes and the related photomicrographs are clear and easy to follow, the graphs are cleanly presented and are quite numerous for a publication of this size.

Some theoretical aspects and technical details are discussed only briefly or omitted entirely for better understanding of the general subject. How the authors decided on what was to be omitted is not explained, but the results leave no doubt that they did an excellent job of choosing.

A rundown of the major entries in the book would include properties of iron, alloys of iron and carbon, decomposition of austenite, heat treatment of steels, hardenability, heat treatment of cast irons, practical considerations (furnaces, quenches, design of parts), nomenclature and chemical composition of steels, recommended heat treatments (for structural, tool, and stainless steels), and properties and uses of steels. •

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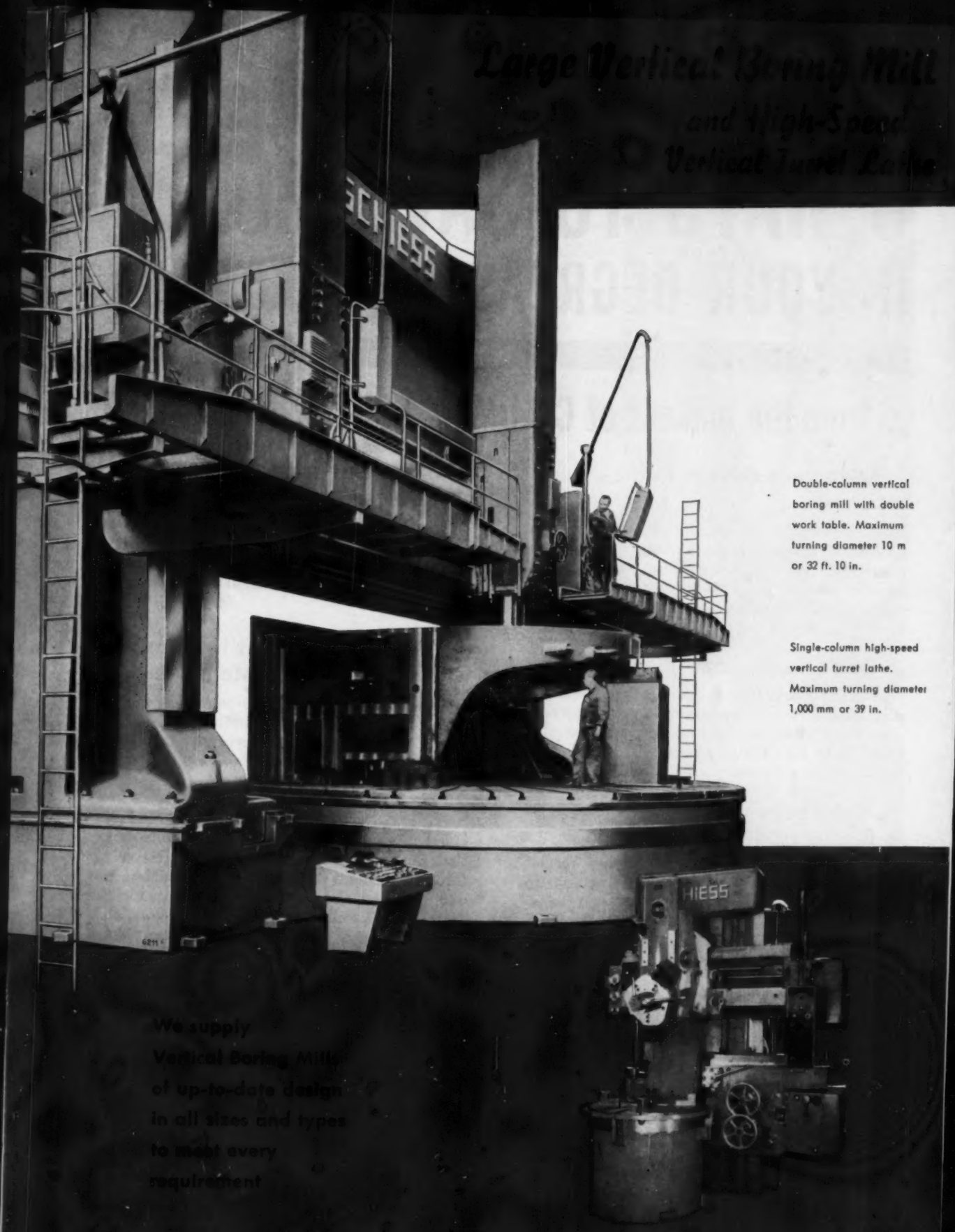

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...from the makers of COLUMBIA-SOUTHERN TRICHLOR

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3. Make sure your solvent is formulated for the job

Columbia-Southern Trichlor contains a special neutral stabilizer which enables it to stand up under continuous operation with high contamination rates. Trichlor's stabilizing system is designed specifically to permit you to handle aluminum as well as other metals safely in the degreaser.

4. Establish good cleanout procedures

Keep an eye on sump temperatures, and distill in time to avoid excessive contamination and low heat transfer. You not only get more efficient operation, but you may also save your equipment and reduce operating costs.

5. Protect equipment investment with scheduled maintenance

Schedule routine maintenance on valves, pumps, piping, gaskets and water separator; regular attention to little items prevents emergency repairs to the whole system.

6. Keep down dragout losses

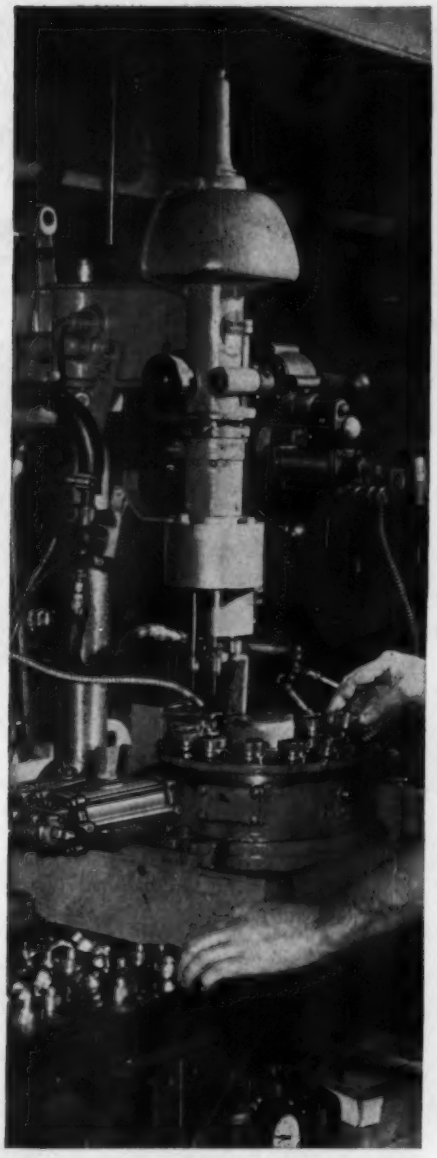
Handle and rack your work properly. We often find that the type, shape and weight of parts going through machines are not given proper consideration. Liquid solvent may be trapped or vapor levels dropped as a result. A review of these factors, plus location of sprays, and throughput speed can reduce waste by a healthy figure.

These simple but effective rules have been developed by the Technical Service group at PPG's Chemical Division, as a result of hundreds of service calls and years of experience in applying Columbia-Southern TRICHLOR to degreasing operations.

Trichlor is built for the job, starting with a "triple-check" quality control system during manufacture. The stability, uniformity and purity of Trichlor are guarded by the blending in of carefully compounded *neutral* stabilizing agents which maintain the solvent in a safe, effective state through the toughest service.

Save money in your vapor degreasing operation by following the six rules above and specifying Columbia-Southern Trichlor. Call your nearby Trichlor distributor or the Columbia-Southern office serving your area.

columbia | southern chemicals
CHEMICAL DIVISION
PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER PITTSBURGH 22, PENNSYLVANIA
DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati • Cleveland Dallas • Houston • Minneapolis • New Orleans • New York • Philadelphia Pittsburgh • San Francisco • St. Louis • IN CANADA: Standard Chemical Limited



To get more work out of a drill press you must get more work to it

Actual machining time in drill press operations is fixed by the nature of the tool and material. But the time taken to get work to the tool, and away from it, is the real cost factor. It's here that costs can be cut—profits made.

It's here that two Bellows-Valvair pneumatic devices can help: The Bellows Drill Press Feed to feed the spindle of the drill press; the Bellows Rotary Feed Table to feed parts to the tool and take them away. With these two units installed on your drill press—the operator loads and unloads—while machining goes on.

Every second a cutting tool stands idle while someone loads and unloads a fixture adds unnecessarily to your cost.

Write for Bulletin DF-100R and RT-1022. Address Dept. AM-461 Bellows-Valvair, Akron 9, Ohio

1021-C

Bellows-Valvair

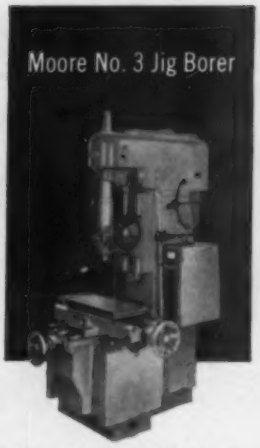
AKRON 9, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

"The No. 3's split the tenths!"

So report users of Moore's New Jig Borer and Jig Grinder

"Our operators feel that these are the best machines they have ever worked on. They take care of the tenth-splitting tolerances required by industry today. Over the years we have enlarged our Moore Jig Boring and Jig Grinding Department to 15 machines." These are the words of Herbert Harig, President (left above), and Karl Harig, Chairman (at right), Harig Manufacturing Corporation, Chicago, Illinois.



You will easily break the "tenth" barrier with this accurate machine. No gibs...no overhang...improved drive ...speed range of 60 to 2250 RPM...11 x 24" table working surface. It bores, drills, reams and spots holes in dies, jigs and production parts with unequalled speed and accuracy.

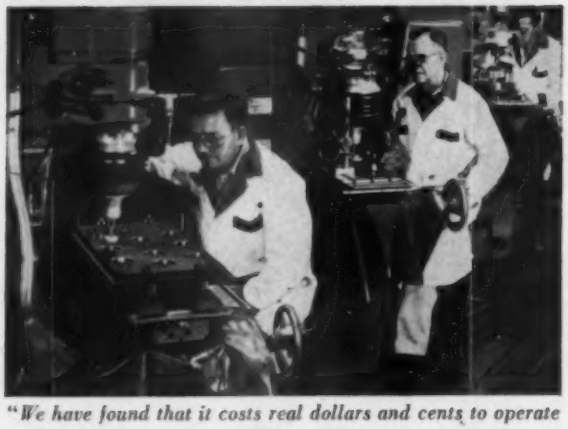
With this new, larger No. 3 model, you can grind—*with split-tenth* accuracy—holes plus regular and irregular contours to size and location after hardening. Faster strokes are provided for chop-grinding... infinite spindle speeds, 40 to 250 RPM...larger table working surface, 11 x 24".

All hardened, ground and lapped ways. Made and calibrated to the new international inch.

Write today for literature describing the many advantages of the No. 3 Moore Jig Borers and Jig Grinders.

MOORE SPECIAL TOOL COMPANY, INC.
800 Union Avenue, Bridgeport 7, Conn.

Among the highly skilled toolroom operators in the Federal Products Corporation, Providence, Rhode Island, is this talented jig grinder operator, Mrs. Florence Smith. Mrs. Smith achieves ultra-precise results with the No. 3 Moore Jig Grinder.



"We have found that it costs real dollars and cents to operate without Moore equipment. This cost factor is just one of many reasons why we recently added the new Moore Model No. 3 Jig Grinder. This Machine, with its tenth-splitting accuracy, hardened ways and wider range, enables us to service more customers better." Statement by Val Koller, President, Koller Die & Tool Co., Milwaukee, Wisconsin.

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

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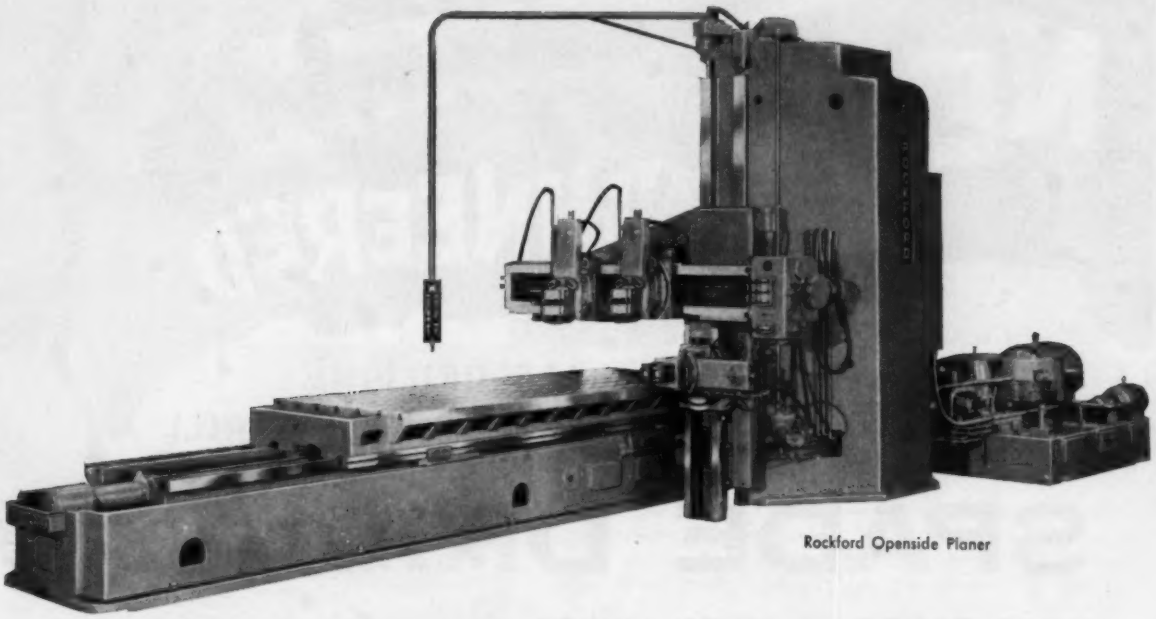
JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

Rockford Hy-Draulic Machines mean more profits!



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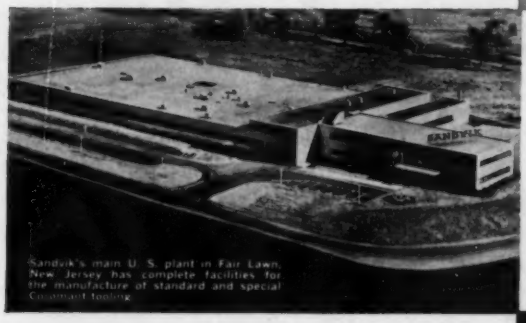
BUILDS CONSISTENT CARBIDE PERFORMANCE

The Sandvik Coromant plant at Stockholm is one of the world's largest for the processing of tungsten carbide for tooling.



Sandvik's main U. S. plant in Fair Lawn, New Jersey has complete facilities for the manufacture of standard and special Coromant tooling.

Every step in the production of Coromant Carbide Tooling from the tungsten ore in the Sandvik controlled mine to the finished product is under strict quality control. Over 200 people are engaged exclusively in quality control of the production of Coromant carbides.

This is the major reason Sandvik Coromant carbides outperform competitive grades in many applications. It is your assurance of consistent quality performance by each Coromant grade from cutting edge to cutting edge — lot to lot.

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A portion of the press room where the carbide is pressed into insert form prior to sintering.

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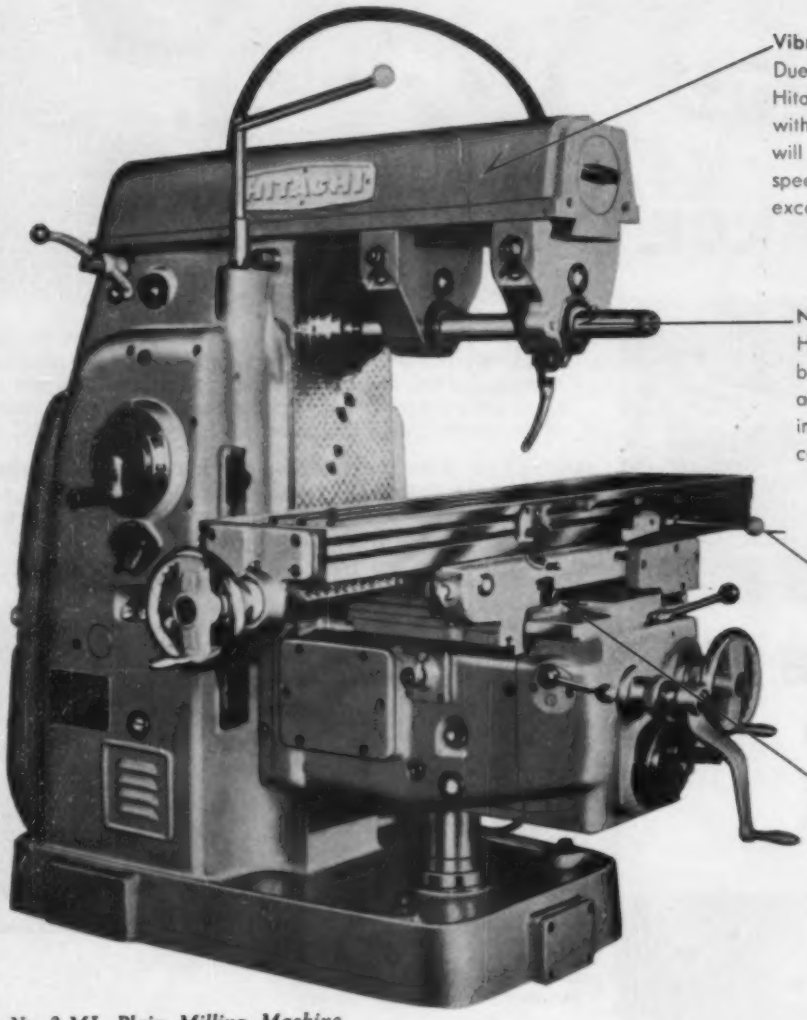

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- 16 Spindle Speeds 25 — 1,500 r.p.m.
- 7.5 h.p. Main Motor

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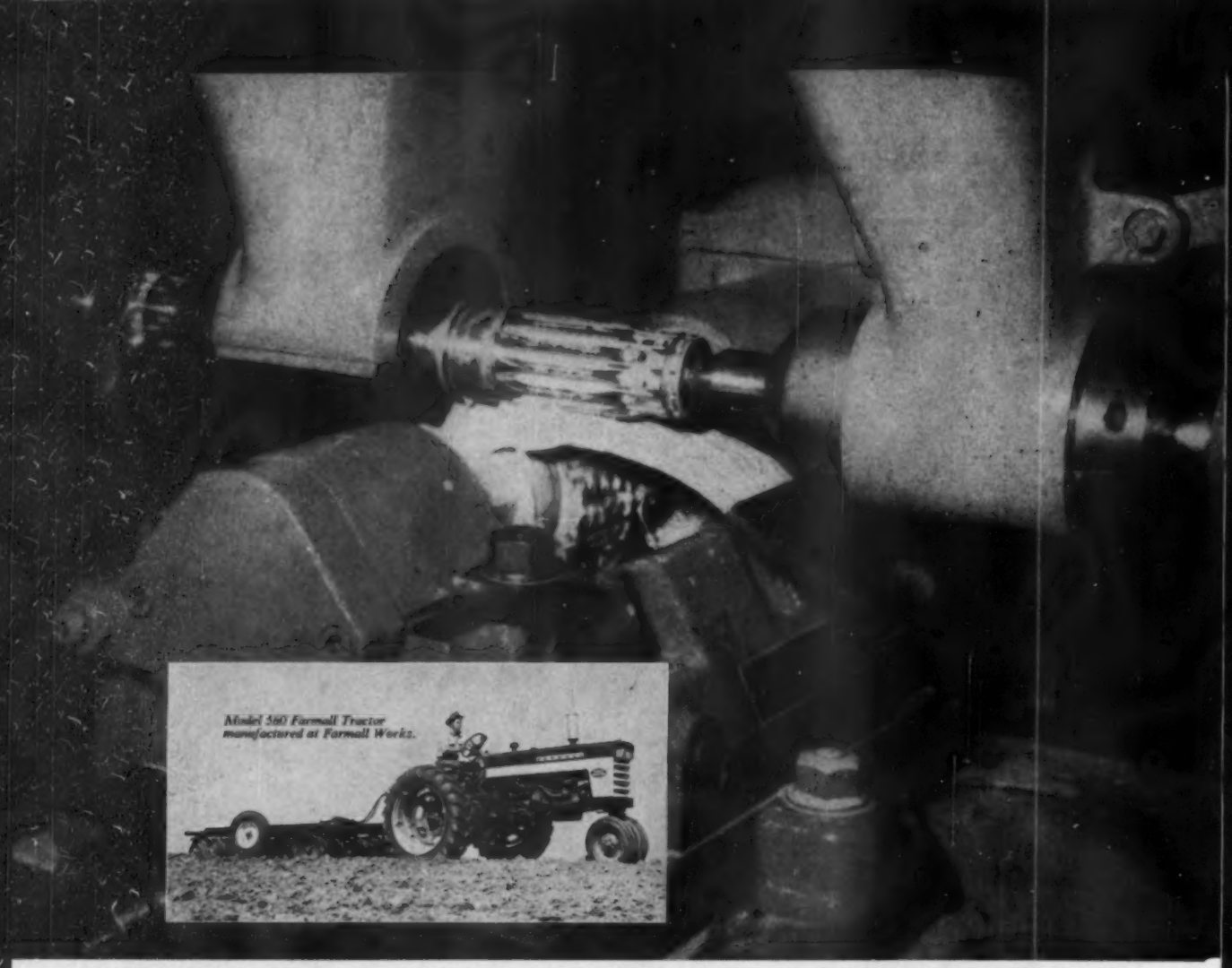

Heavy flow of Kerns Soluble Cutting Fluid prolongs tool life while keeping part and hob exceptionally cool during gear hobbing operation on a Farmall tractor clutch shaft.

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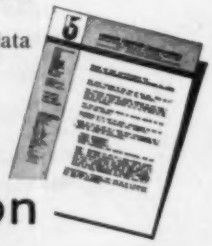
Write for further details on Kerns MEMO BILLING TRIAL BASIS offer and/or technical data sheets on any of the above items.



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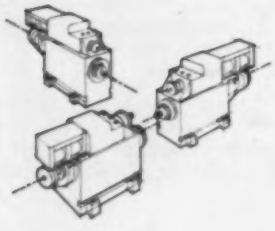

For precision miniature boring, this Whitnon reciprocating spindle has outperformed boring machines costing tens of thousands of dollars. Versatile in concept, it can be positioned and re-positioned on a surface plate, for complete flexibility. Versatile in operation, its fast infeed, controlled boring feed, and dwell time are all instantly and easily variable. Accurate in performance, its rotational error is less than .00003", micrometer depth control repeats to within .0002", with a travel error of less than .00005" over the entire 2" travel range. Optional drive and tool-mounting details are offered, and there's a larger version of the unit—with a travel range of 4"—which maintains the identical base-to-shaft-centerline dimension so the units can be intermixed in the same work set-up. Further details on request.

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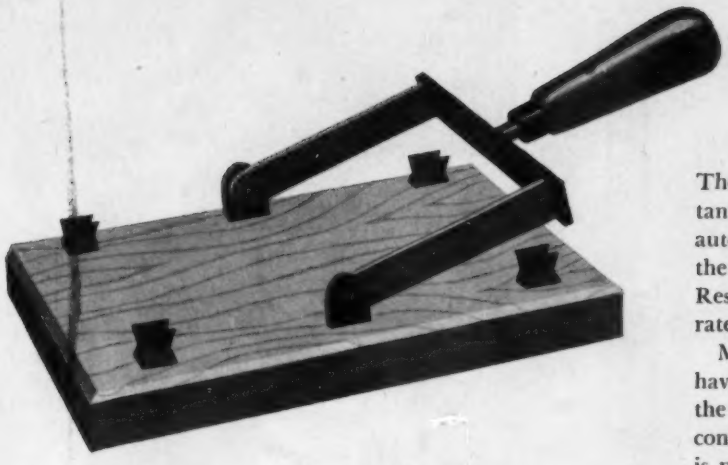

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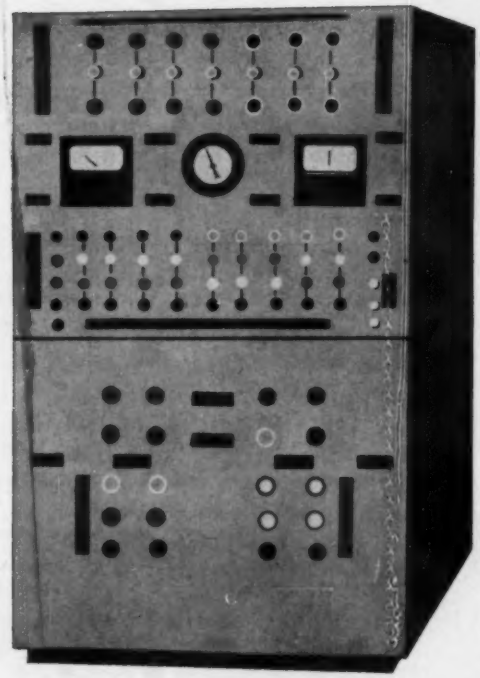

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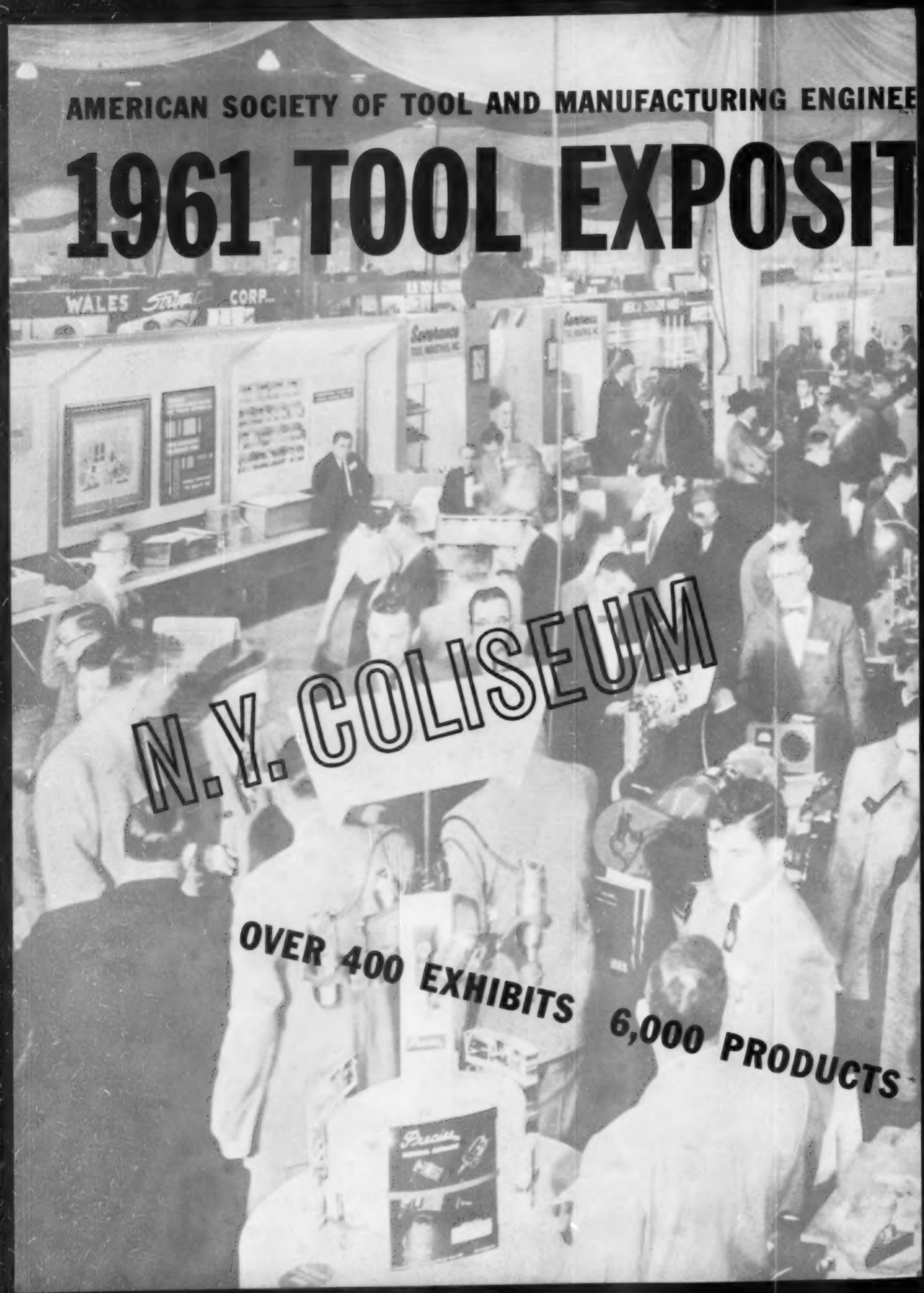
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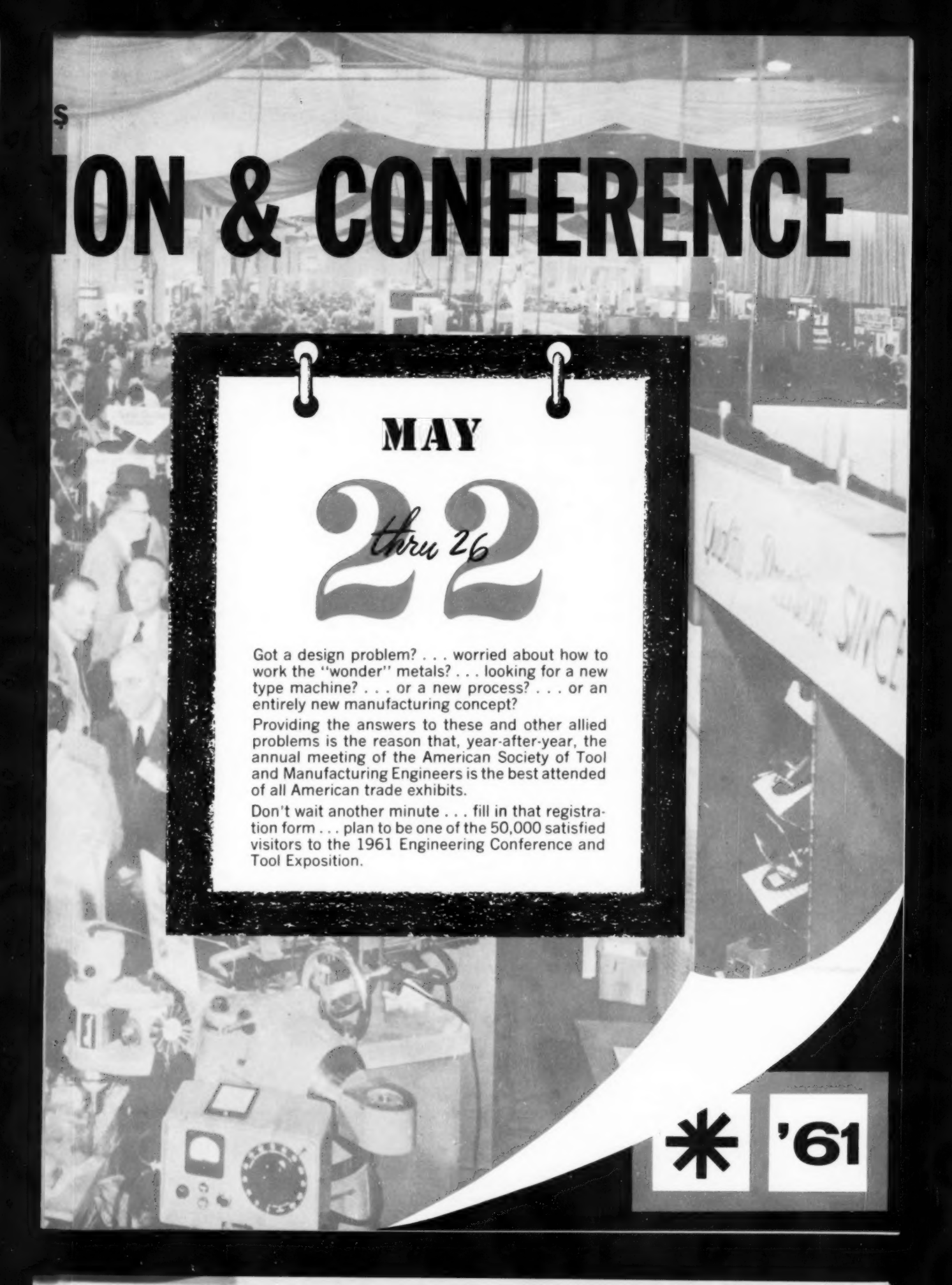
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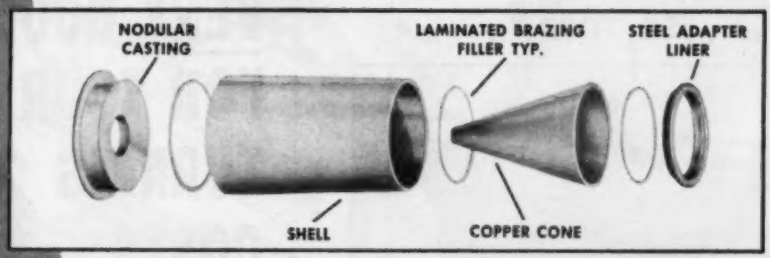

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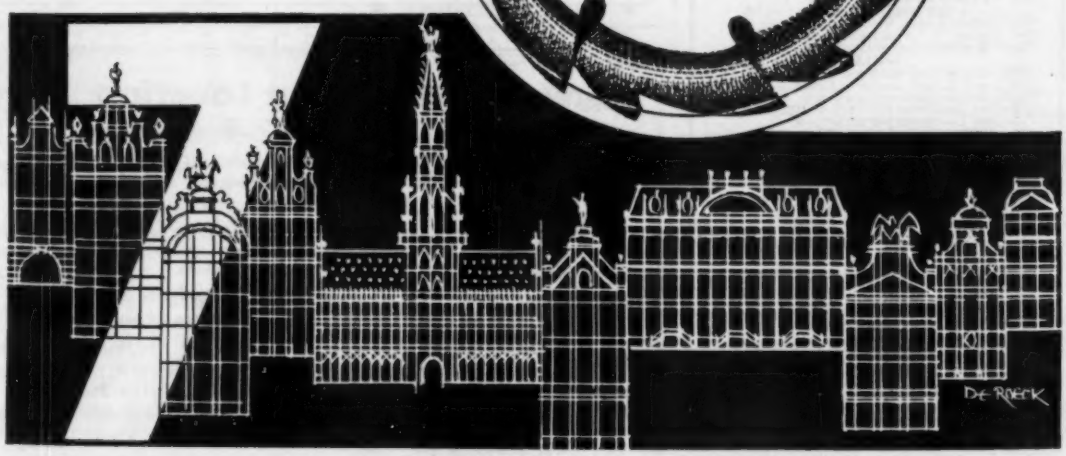

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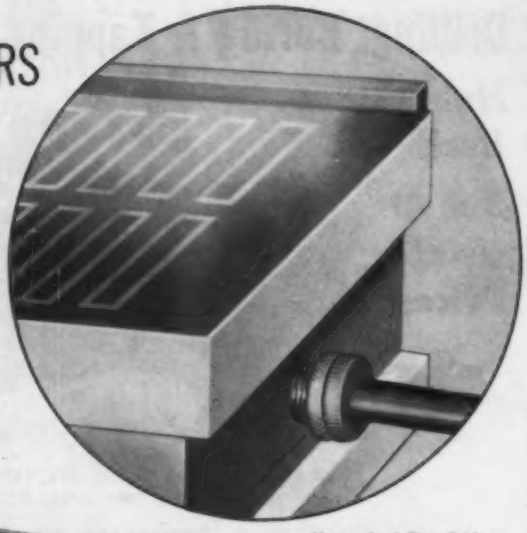

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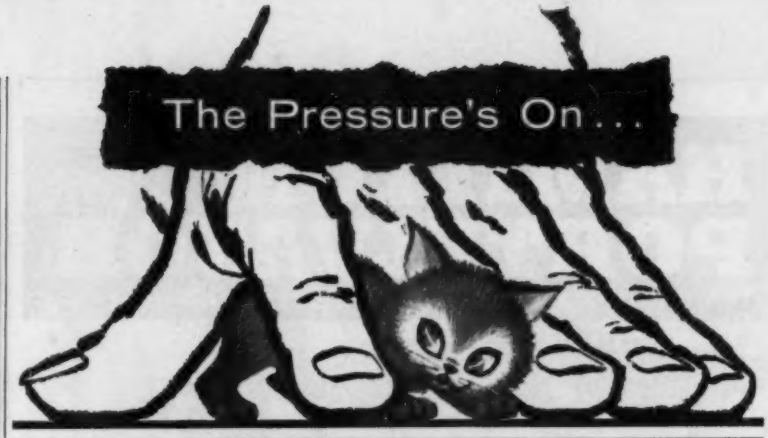

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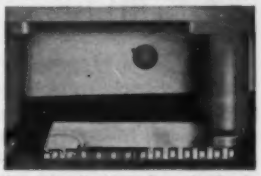

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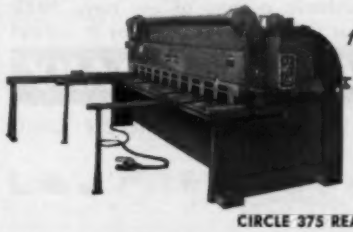

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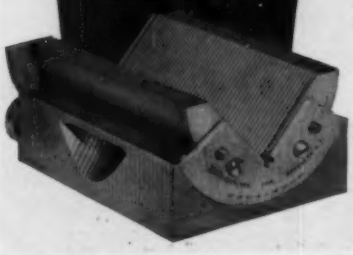

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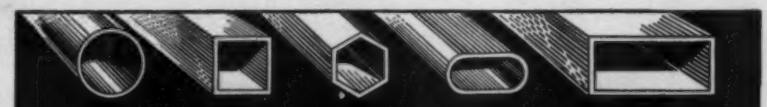

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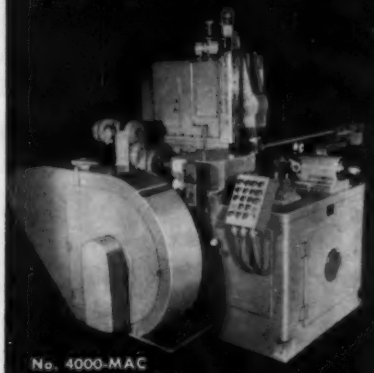

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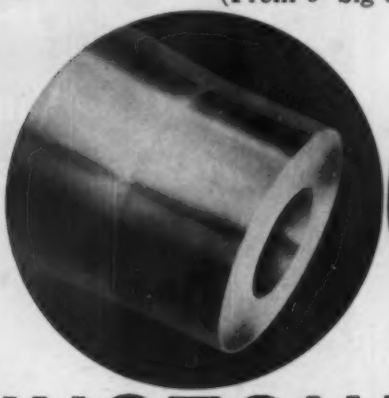

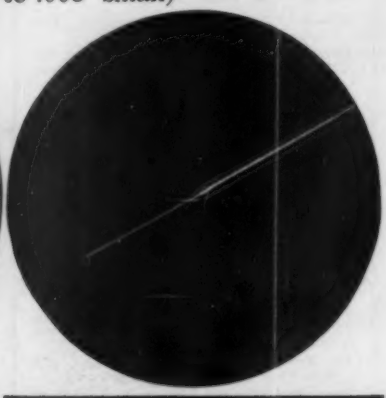

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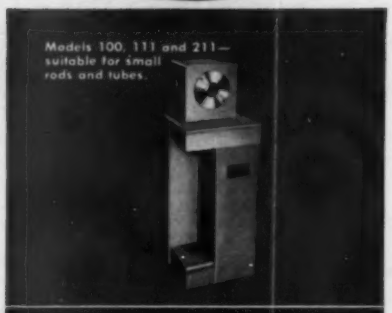

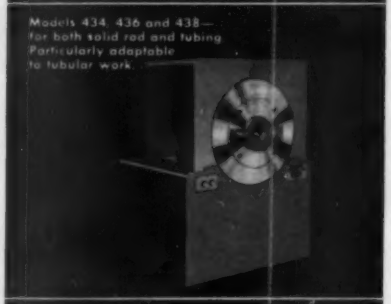

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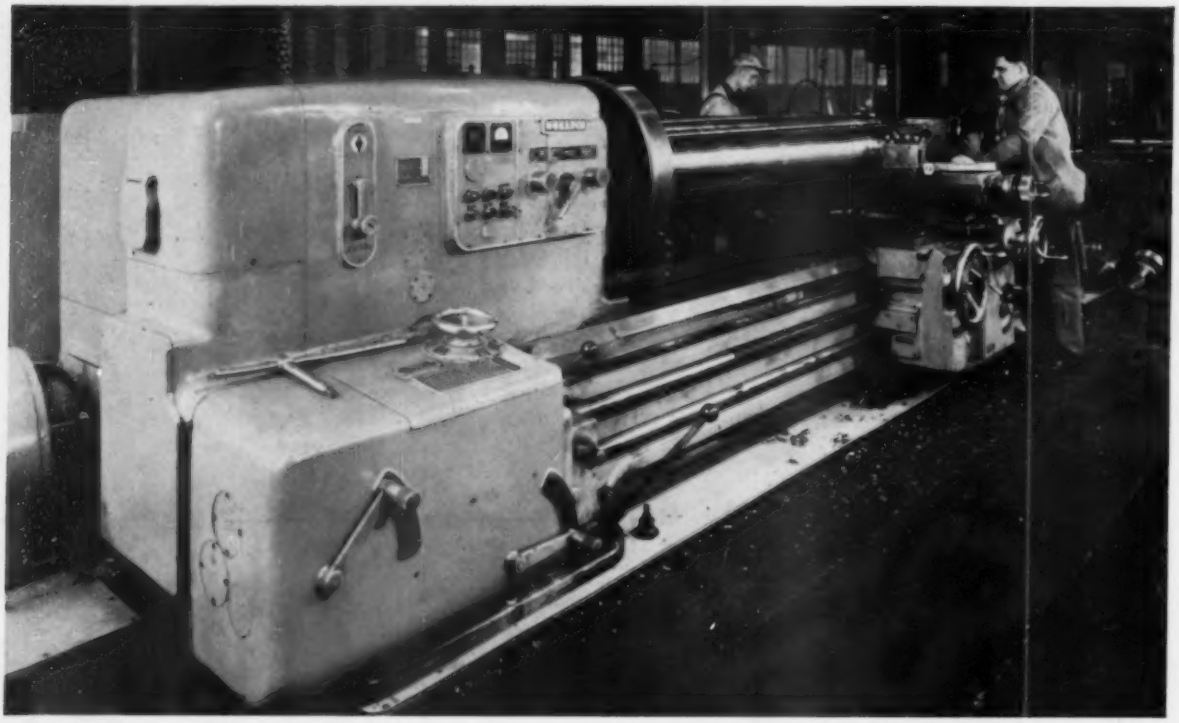

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